144/440(430)MHz FM DUAL BANDER

TH-77A/E

SERVICE MANUAL

KENWOOD

B51-8057-00(B)1105

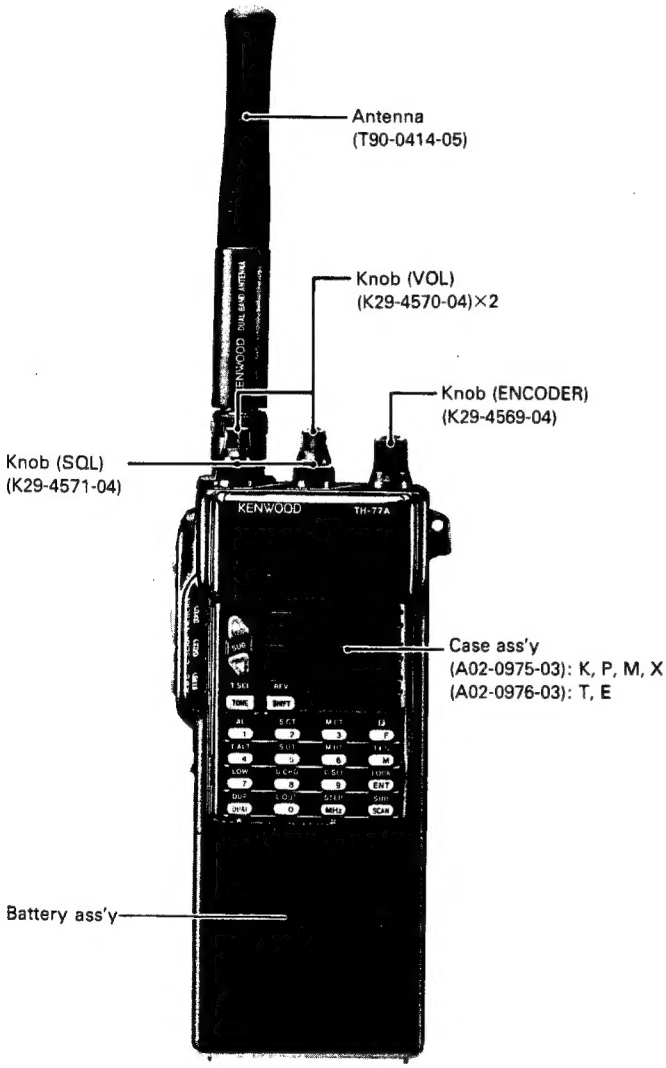


Photo is TH-77A.
*Refer to parts list on page 29.

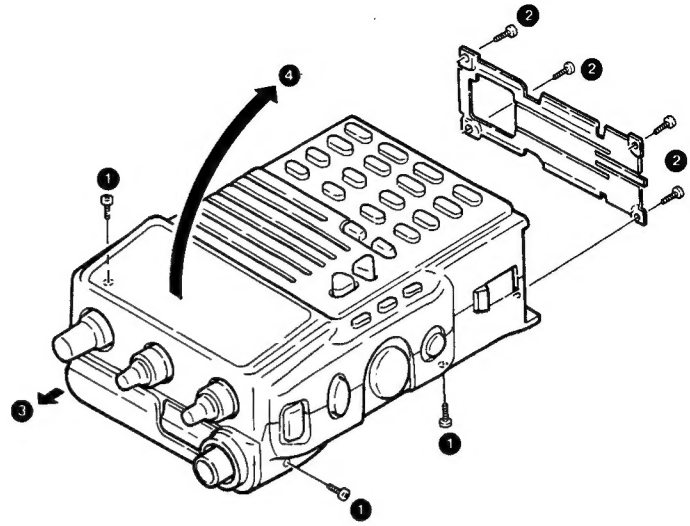
CONTENTS

DISASSEMBLY FOR REPAIR

1. Removing the case

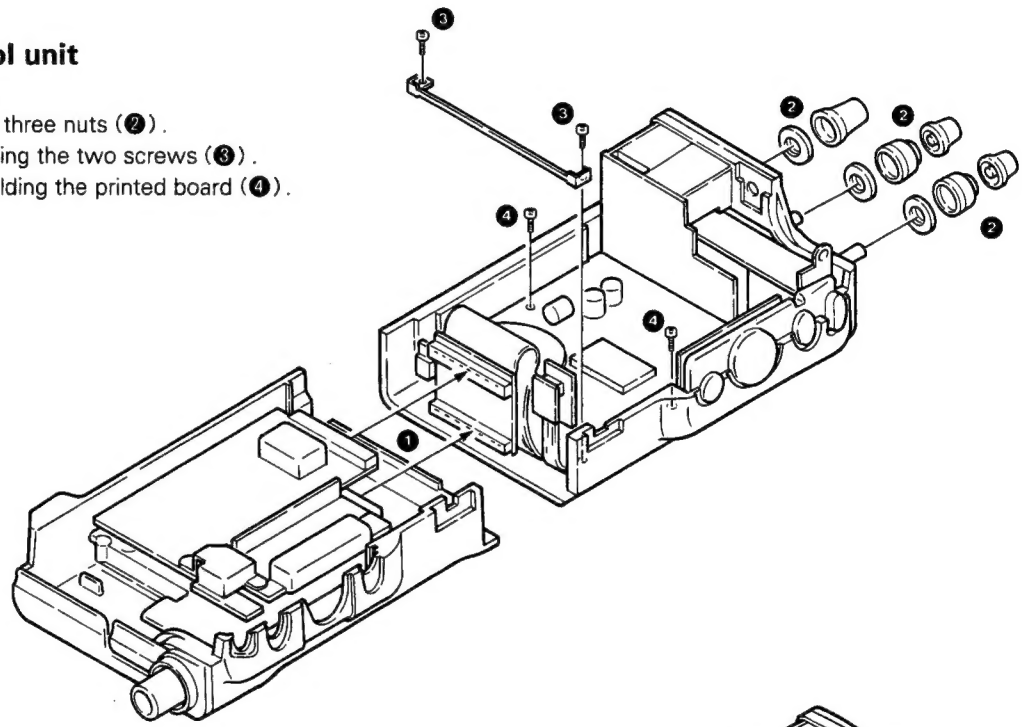
1) Remove the three screws from the side faces of the case (❶).
2) Remove the four screws holding the bottom plate (❷).
3) Remove the cap from the panel (❸).
4) Pull up the front case off the panel side (❹).

NOTE: This should be done carefully so that the FPC cabling inside the case is not accidentally cut.



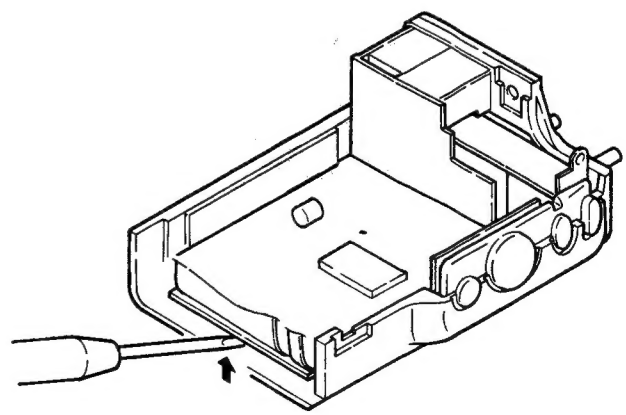
2. Removing the control unit

1) Pull out the connector (❶).
2) Remove the five knobs and three nuts (❷).
3) Detach the clamp by removing the two screws (❸).
4) Remove the two screws holding the printed board (❹).



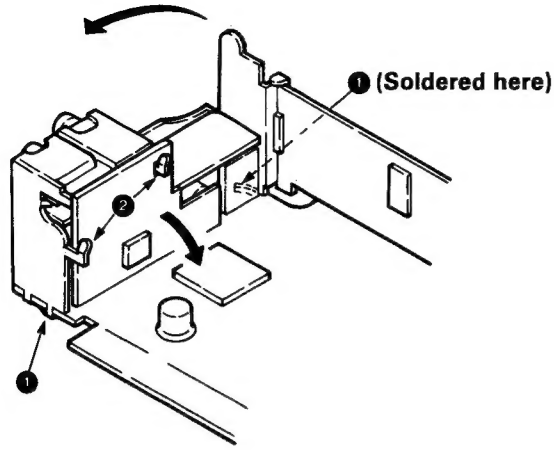
5) Raise the control board by inserting a slotted screwdriver between its underside and the front case.

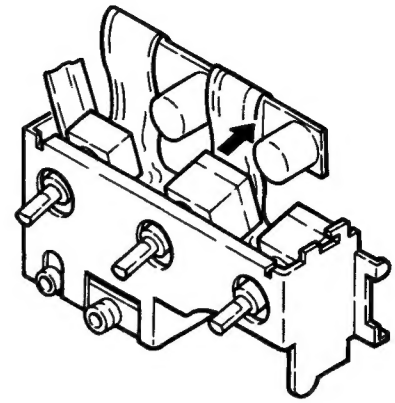
NOTE: The FPC should not be pulled.



DISASSEMBLY FOR REPAIR

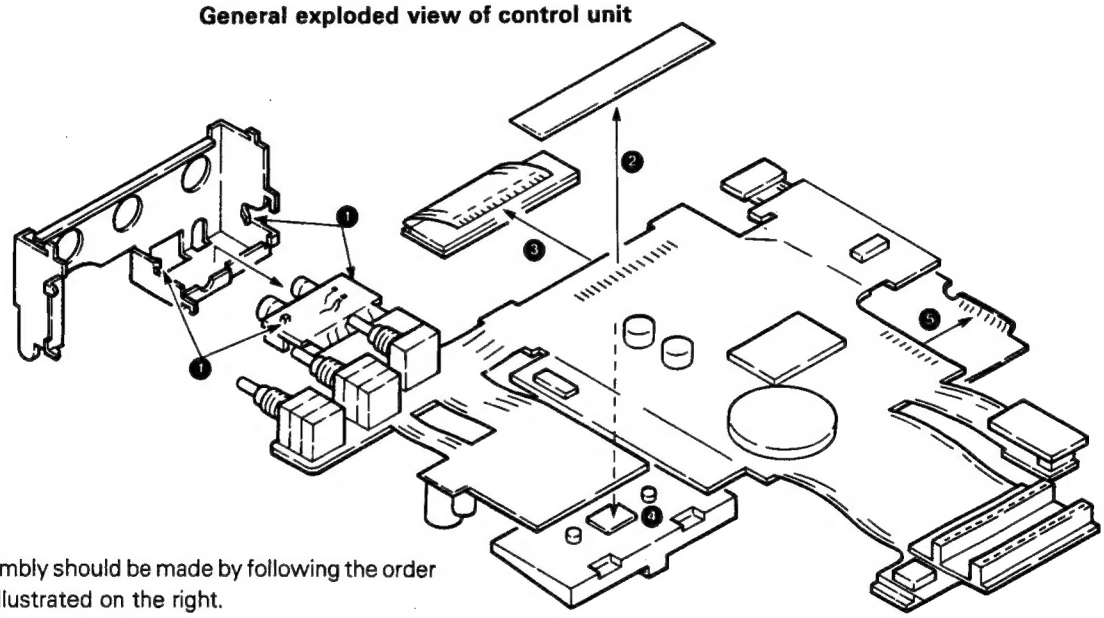
3. Disassembling the control unit





1) The panel is fastened by the claws of the sub-panel. Raise the sub-panel by bending the two claws (❶).
2) Turn down the board by bending another two claws (❷).
3) Remove the volume encoder from the panel by holding its rear edge.

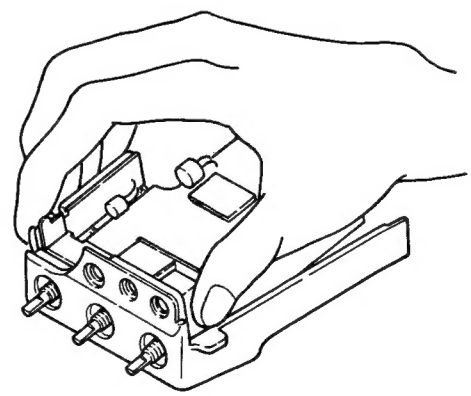
General exploded view of control unit



4) Overall disassembly should be made by following the order ❶~❺ as illustrated on the right.

4. Assembling the control unit

1) Hold the sub-panel as shown on the right and fit it inside the panel by aligning the heads of MIC/SP jacks to the holes in the panel.
2) Push the PTT knob and control board into position.
3) Screw down the control unit, but after tightening the round nuts of the volume encoder (for positioning purpose).



CIRCUIT DESCRIPTION

(1) Frequency Configuration

The TH-77 has independent PLL circuits and intermediate-frequency amplifiers for the VHF and UHF bands. A VHF signal and a UHF signal can thus be received at the same time. The UHF signal can be received at the same time as the VHF signal by doubling the local oscillation frequency for the VHF band. (See Figure 1.)

The received VHF single is converted to the first intermediate frequency (IF) of 45.05 MHz using the first local oscillator, frequency of 181.05 to 219.05 MHz, and is mixed with the second local oscillator frequency of 45.505 MHz to produce the second IF of 455 kHz.

The received UHF signal band is converted to the first IF of 58.525 MHz using the first local oscillator frequency of 371.475 to 391.475 MHz, and is mixed with the second local oscillator frequency of 58.070 MHz to produce the second IF of 455 kHz.

The local oscillator frequency for the VHF band is doubled, when the UHF signal is received at the same time. The UHF signal is converted to the first IF of 45.05 MHz for the VHF band using a frequency of 384.95 to 404.95 MHz obtained when the first local oscillator frequency of 192.475 to 202.475 MHz for the VHF band is doubled. The resulting frequency is mixed with the second local oscillation frequency of 45.505 MHz to produce the second IF of 455 kHz.

As described above, signal reception for the VHF, UHF, or sub-UHF band is based on a double-conversion system. In the transmit signal channel, a directly oscillated voltage-controlled oscillator (VCO) signal for the VHF and UHF bands is sent to the reactance modulator, amplified to the required level by a linear amplifier, and transmitted.

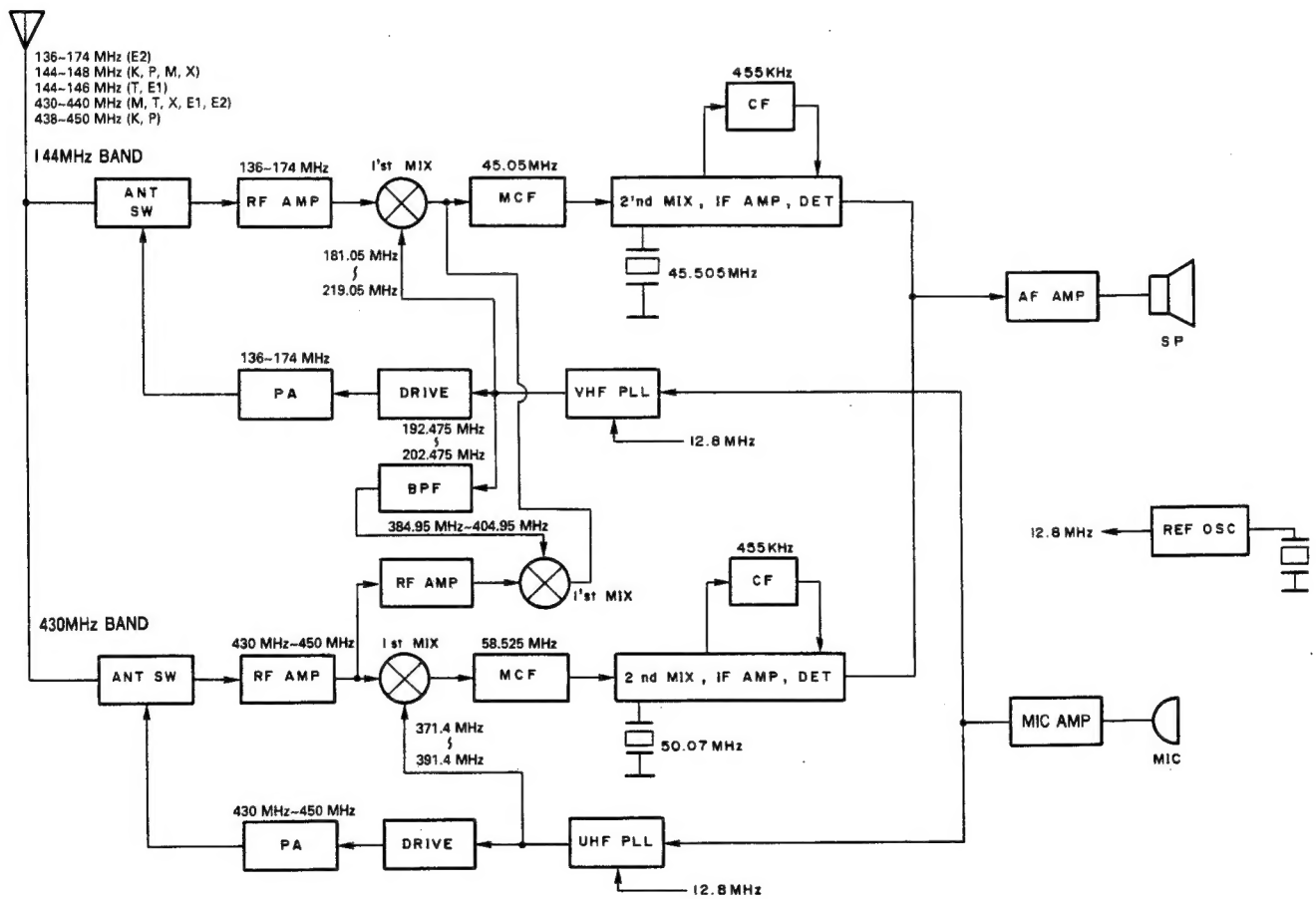


Fig. 1 Circuit configuration by frequency

CIRCUIT DESCRIPTION

(2) Receive Signal Channel

The TH-77 uses common antenna for the VHF and UHF bands, so it has an internal duplexer. The TH-77 also incorporates two audio amplifiers for internal and external speakers. (See Figure 2.)

Item	Rating
Nominal center frequency (fo)	45.050 MHz
Pass bandwidth	fo ±7.5 kHz or more at 3 dB
Attenuation bandwidth	fo ±22 kHz or less at 25 dB
Guaranteed attenuation	80 dB or more within fo ±910 kHz Spurious: 40 dB or more
Ripple	1.0 dB or less
Insertion loss	4.0 dB or less
Terminal impedance	800Ω/2 pF

Table 1 MCF (L71-0409-05) (TX-RX unit XF1)

Item	Rating
Nominal center frequency (fo)	58.525 MHz
Pass bandwidth	fo ±8.5 kHz or more at 3 dB
Attenuation bandwidth	fo ±25 kHz or less at 25 dB fo ±70 kHz or less at 60 dB
Guaranteed attenuation	80 dB or more at fo ±910 kHz
Ripple	1.0 dB or less
Insertion loss	4.0 dB or less
Terminal impedance	380Ω/3.5 pF

Table 2 MCF (L71-0410-05) (TX-RX unit XF201)

Item	Rating
Center frequency of 6 dB bandwidth (fo)	455 kHz±1.5 kHz
6 dB bandwidth	±7.5 kHz or more
40 dB bandwidth	±15 kHz or less
Ripple	1.5 dB or less (455 kHz±1.5 kHz)
Guaranteed attenuation	27 dB or more within fo ±100 kHz
Insertion loss	6 dB or less
Terminal impedance	1.5 kΩ

Table 3 Ceramic filter (L72-0362-05) (IF unit CF1, CF2)

2-1 VHF Receiving Block

The signal from the antenna is passed through a low-pass filter, a duplexer, and antenna switches D4 (M1808) and D5 (MA77), and amplified by Q7 (2SK360). The unwanted band components of the signal are eliminated by a bandpass filter. The resulting signal is mixed with the first local oscillator frequency by first mixer Q6 (2SC4083), and converted to the first IF. The unwanted components of the converted first IF signal are attenuated by a pair of MCFs and amplified by IF amplifier Q5 (2SC4619). The signal is then input to IC2 (MC3372D). The input signal of IC2 is mixed with the second local oscillator frequency, and converted to the second IF. The unwanted components of the converted signal are attenuated by a ceramic filter. The resulting signal is amplified, then detected by a quadrature detector to produce an AF signal.

2-2 UHF Receiving Block

The signal from the antenna is passed through a low-pass filter, a duplexer, and antenna switches D204, D205 (M1808), and D206 (MA77), then amplified by Q207 (2SC4226). The signal is then split into the main UHF and sub-UHF bands by a power divider. The unwanted band components of the signal are attenuated by a helical filter. The resulting signal is amplified by Q206. The signal is mixed with the first local oscillator frequency by first mixer Q205 and converted to the first IF, and the unwanted components are attenuated by a pair of MCFs. The signal is then amplified by IF amplifier Q210 (2SC4215), and input to IC202 (MC3372D). The resulting signal is detected by a quadrature detector to produce an AF signal in the same way as in the VHF receiving block.

2-3 Sub-UHF Receiving Block

The signal from the antenna is input to the UHF receiving block. The input signal of the UHF receiving block is amplified by Q207, split by a power divider, and input to the sub-UHF receiving block. The signal amplified by Q201 (2SC4226) is passed through a bandpass filter to attenuate unwanted signal components. The signal is then mixed with a frequency twice the first local oscillator frequency for the VHF band by first mixer Q202 (2SC4083), then converted to the first IF for the VHF band. The VHF receiving block is used for the signal flow following the first IF signal.

The collectors of the first mixers for the sub-UHF and VHF bands are placed facing each other to prevent the first mixers being influenced by other bands when the bias is turned on or off.

CIRCUIT DESCRIPTION

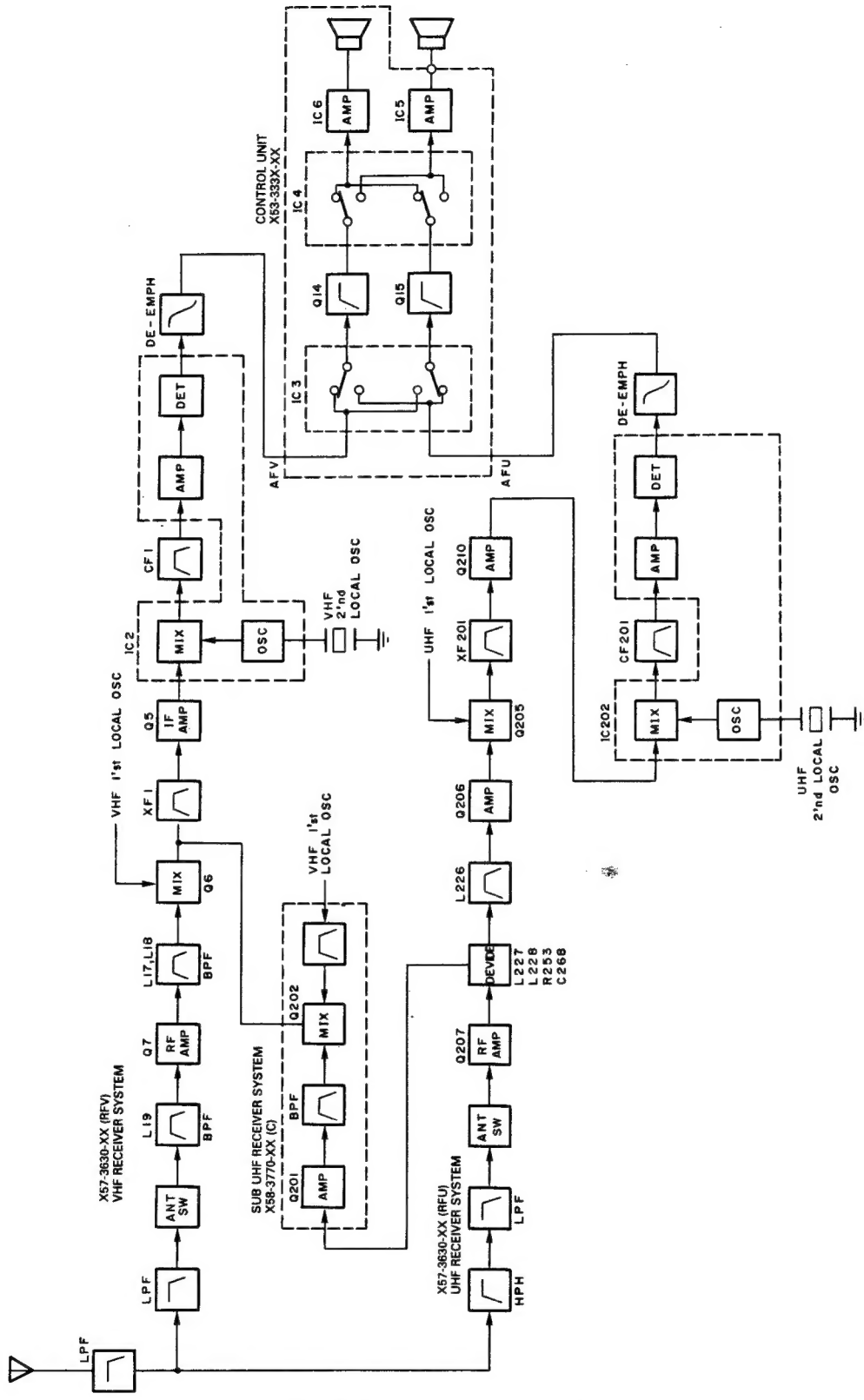


Fig. 2 RX section block diagram

CIRCUIT DESCRIPTION

2-4 Audio Circuit

• Outline

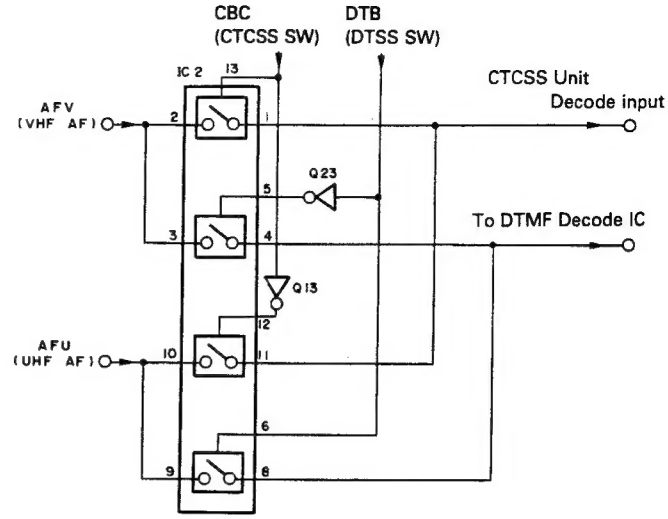
The AFV and AFU signals that are deemphasized in the transmitting-receiving unit are input to control unit IC3 (TC4066BF) and separated into the main signal and subsignal. The separated signals are passed through high-pass filters and input to IC4, which performs speaker selection and mix/separate selection. The resulting signals are amplified by IC5 and IC6 (NJM386BM), then output.

2-4-1 CTCSS and DTSS selection

Input of the AFV and AFU signals to the CTCSS unit and DTMF decoder is switched by the CBC and DTB signals. The CBC and DTB signals are unstable when the CTCSS, DTSS, and paging functions are off. Figure 3 shows the port status.

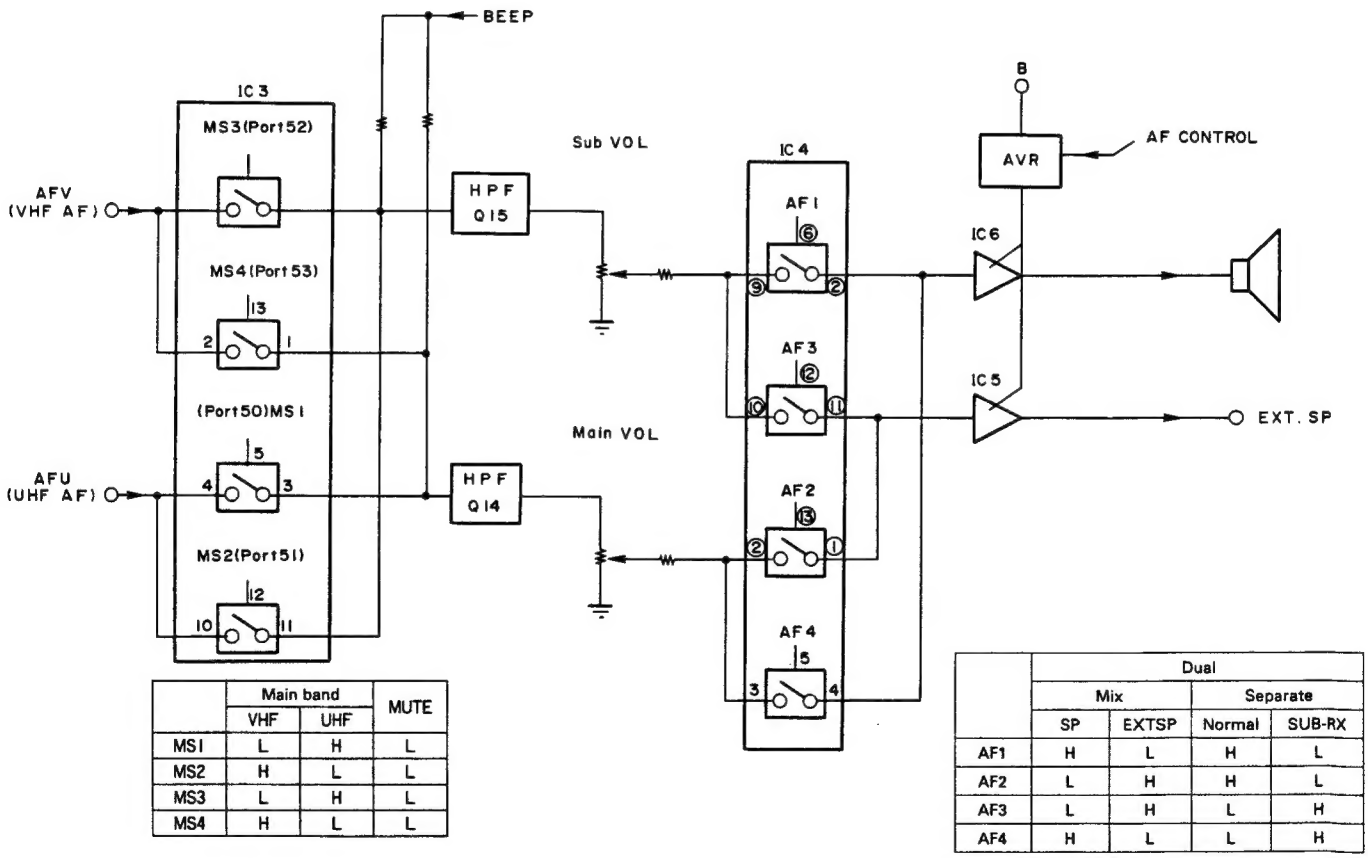
2-4-2 Received audio signal selection

The audio signals for the VHF and UHF bands are separated into the main signal and subsignal by IC3. IC3 opens all switches for muting when it outputs a BEEP pulse. IC4 performs speaker selection and mix/separate selection. Figure 4 shows the port status.



	CBC	DTB
VHF Signal input	H	L
UHF Signal input	L	H

Fig. 3 CTCSS, DTSS switching circuit



	Main band		MUTE
	VHF	UHF	
MS1	L	H	L
MS2	H	L	L
MS3	L	H	L
MS4	H	L	L

	Dual			
	Mix		Separate	
	SP	EXTSP	Normal	SUB-RX
AF1	H	L	H	L
AF2	L	H	H	L
AF3	L	H	L	H
AF4	H	L	L	H

* When the normal separate mode is set, the subband is heard on the internal speaker and the main band, on the external speaker.

Fig. 4 RX audio switching circuit

CIRCUIT DESCRIPTION

2-4-3 External speaker detection

The microcomputer detects that the REM pin of the speaker jack is zero or the remote switch voltage when the speaker plug is inserted. The audio input is then switched from IC6 to IC5 by IC3.

2-4-4 Audio amplifier

Amplifier IC6 (NJM386BM) is used for the internal speaker, and amplifier IC5, for the external speaker. The power for IC6 and IC5 is produced by Q16 (2SB1182) and Q17 (2SC4617). D4 (MA110) and Q18 (DTA144WE) are a power on/off control circuit.

2-4-5 Squelch circuit

Since the squelch circuit for the UHF band is configured identically to that for the VHF band, only the squelch circuit operation for the VHF band is described below. The detection output signal of IC2 is filtered by an internal amplifier in IC2. The noise components of the signal are amplified by Q13. The resulting signal is rectified by D16 to produce a squelch signal. The voltage at the input pin of Q11 is turned on or off by the squelch variable resistor. The SCV signal and hysteresis switches are activated by Q12.

2-4-6 Signal-strength meter circuit

The TH-77 employs signal-strength meter circuits IC2 and IC202 (MC3377D) for the transmitting-receiving unit. For the VHF band, the microcomputer input voltage is adjusted by VR1 of the transmitting-receiving unit. For the UHF band, it is adjusted by VR6 of the control unit. The liquid-crystal display for the VHF and UHF bands appears at the same time. Each signal-strength meter signal is thus added to the input pins of different analog-to-digital converters. The liquid-crystal display consists of five steps in a pair for the VHF and UHF bands.

CIRCUIT DESCRIPTION

(3) Transmit Signal Channel

In the transmit signal channel, a directly oscillated voltage-controlled oscillator (VCO) signal for the VHF and UHF bands is sent to the reactance modulator. The output levels of the microphone amplifiers for the VHF and UHF bands can be adjusted independently. (See Figure 5.)

3-1 Modulator Circuit

The audio signal from the microphone is sent to control unit IC1 (NJM4560M), then a preemphasis circuit, amplifier, limiter amplifier, and splatter filter. The signal is then selected for the VHF and UHF bands by Q12. The frequency deviation can be adjusted by VR3 and VR4. The modulation signal is applied to a varicap diode for voltage-controlled oscillator modulation for the VHF and UHF bands, then sent to the reactance modulator. The input pins are jumpered by Q11 when a dual-tone multifrequency (DTMF) is used.

3-2 Drive Circuit and Final-Stage Amplifier

The voltage-controlled outputs for the VHF and UHF bands are sent to two-stage amplifiers, then amplified to the required level by the RF power amplifier module. The amplified output signals are passed through the antenna switches for the VHF and UHF bands, and sent through a duplexer and lowpass filter to the antenna.

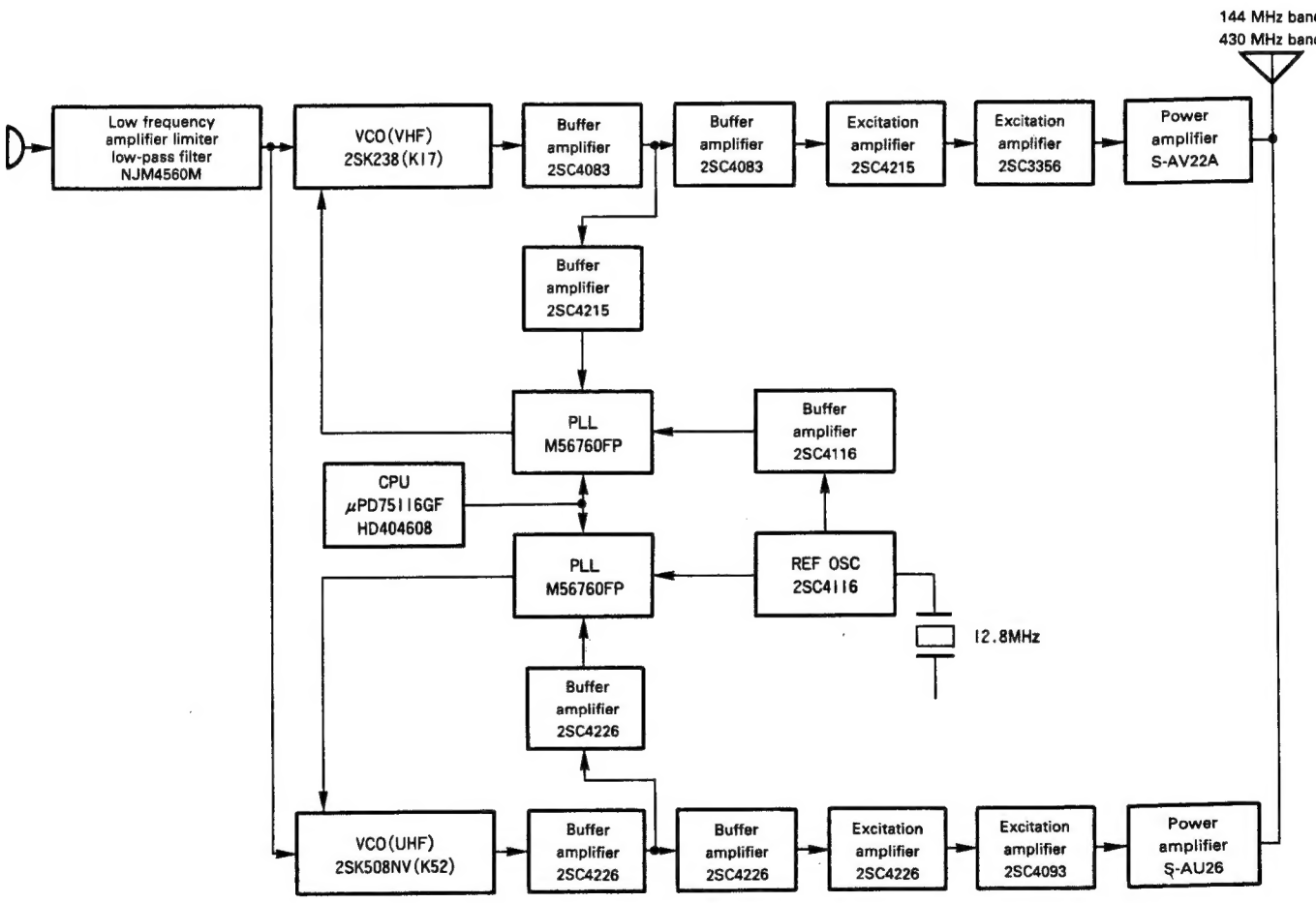


Fig. 5 Transmitter system block diagram

CIRCUIT DESCRIPTION

3-3 APC Circuit

The automatic phase control (APC) circuit produces attain a stable transmission output. This circuit also detects the current of the final-stage amplifier and controls the input power level of the amplifier.

	H/L1	H/L2
Hi	L	L
Mid	H	L
Low	H	H

Table 4

The APC circuit operation for the UHF band is explained below (Figure 6). During transmission, Q4 is turned on by the 5TV and 5TU signals, and IC1 is activated. The output power of IC101 is detected as the voltage drop across R4 and R5. The voltage at both ends of D1, which is completely stabilized by the constant current source of Q1, is compared with the voltage divided by VR1, R11, and VR2. The current flowing through D101 is controlled so that no voltage difference occurs. Consequently, the drive input power of IC101 decreases when the power amplifier module current increases, and the drive power increases when the module current decreases.

For high-, middle-, and low-level selection, Q2 and Q3 are turned on then off when the H/L1 and H/L2 ports are controlled. The reference voltage for IC1 is then switched. (See Table 4.)

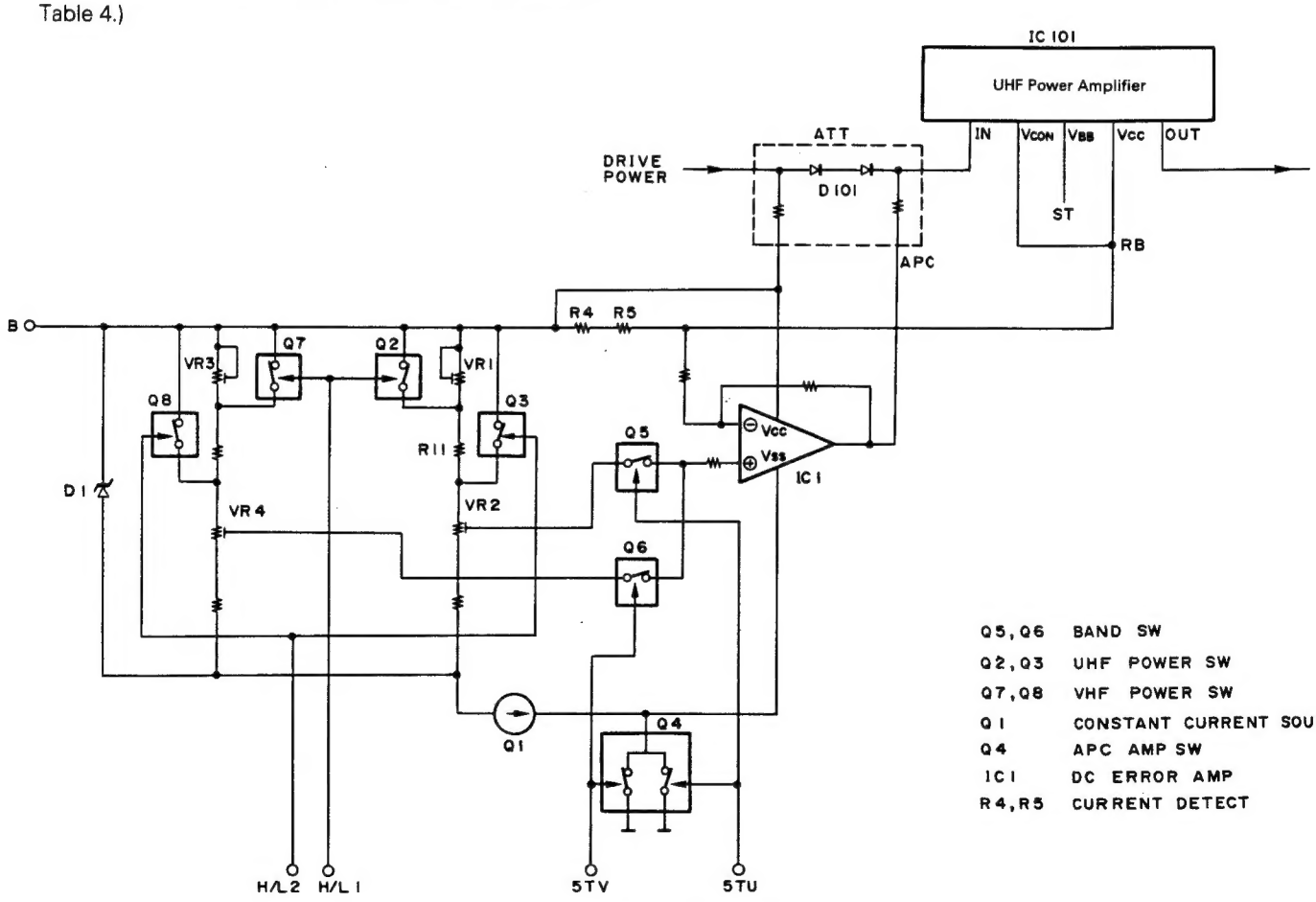


Fig. 6 APC circuit

CIRCUIT DESCRIPTION

(4) Power Supply Circuit

External power is always supplied to IC8 and IC13. The IC8 output is sent to IC10 and IC12. Therefore, the current for IC8 and IC13 and the microcomputer backup current flow when the power is turned off with the battery connected. The PW port of IC10 is made low when the power is turned on. Q20 (1/2) is then turned on. As a result, a reference voltage is applied to each regulator. Power is supplied to the CTCSS unit when Q20 (2/2) is turned on. (See Figure 7.)

The 5C and 5R signals are produced by Q5 and Q6. A 5T signal is produced by Q8 and Q9. The 5C, 5R, and 5T signals are distributed by each switch. The reference OSC power for the phase-locked loop (PLL) circuit is supplied from the 5C signal. The 5RV, 5RVC, and 5CV signals are turned on during VHF reception. The 5RU, 5CU, and 5RU signals are turned on during UHF reception. The 5TV and 5TU signals are turned on according to the band in use during transmission.

(5) Save Circuit

Q7 is controlled by the SAVE pin of IC10. The 5C and 5R regulators of Q5 are then turned on or off to reduce the mean current consumption. The automatic power-off (APO) function interrupts all power supplies to circuits except the microcomputer by turning off Q20. APO operation thus results in the much the same current consumption as when the power is off.

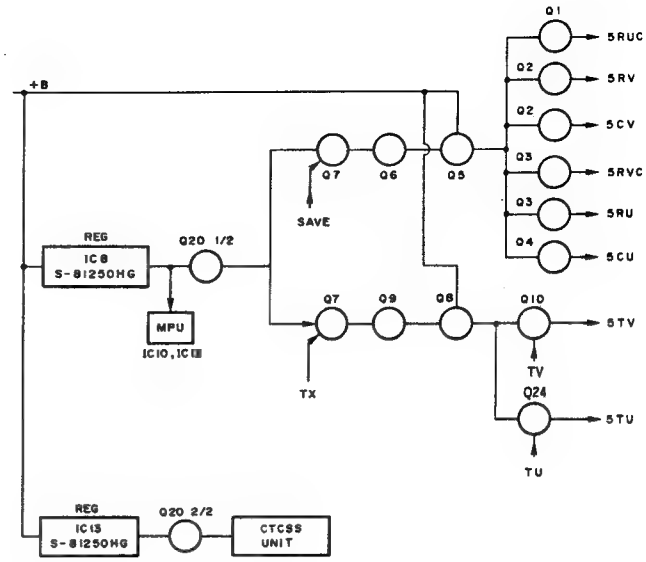


Fig. 7 Power supply circuit

CIRCUIT DESCRIPTION

(6) PLL Circuit

The oscillator circuit consists of reference oscillators with independent phase-locked loop (PLL) and voltage-controlled oscillator (VCO) circuits for both the VHF and UHF bands. The oscillator frequency is sent to the V/U PLL IC.

6-1 PLL

The 12.8-MHz crystal oscillator, X202, is oscillated by Q211. The oscillation output is sent to IC201 and Q212, and the output signal of Q212 is sent to IC1. The reference oscillation frequency is divided by IC1 (VHF) and IC201 (UHF) to produce a reference frequency of 5 kHz or 6.25 kHz.

The VCO output of the comparison frequency is amplified by Q2 (VHF) and Q202 (UHF), then divided by pulse swallow PLL circuits IC1 and IC2. PLL synthesizers with 5-, 10-, 12.5-, 15-, 20-, and 25-kHz steps are established by comparing the phase of the X201 crystal oscillator frequency with that of the divided reference frequency.

6-2 VCO

The desired frequency is produced by direct oscillation by a Colpitts oscillator circuit consisting of VCO-V (X58-3740-00), VCO-U (X58-3760-00), and field-effect transistor (FET) Q2. The VCO control voltage is applied to varicap diodes D1 and D2 to change the oscillation frequency. During reception, the T/R pin is made high, and Q1 and D4 are turned on. The oscillation frequency is then switched. VCO-U makes the T/R pin low during reception and turns Q1 and D3 off to select the range of the oscillation frequency.

6-3 Unlock Detector Circuit

When the PLL circuit is in the unlock mode, the pulses output to the LOCK pins (pin 13) of IC1 and IC201 are waveform-shaped by R6 and C7 for the VHF band and R205 and C208 for the UHF band. The UL pin is then amde high. The voltage at the UL pin is detected by the microcomputer to select the transmitter or the receiver and control the timing.

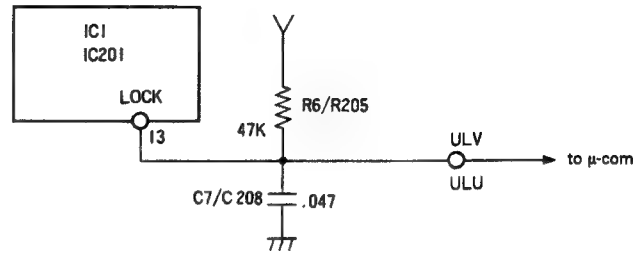


Fig. 9 Unlock Detector Circuit

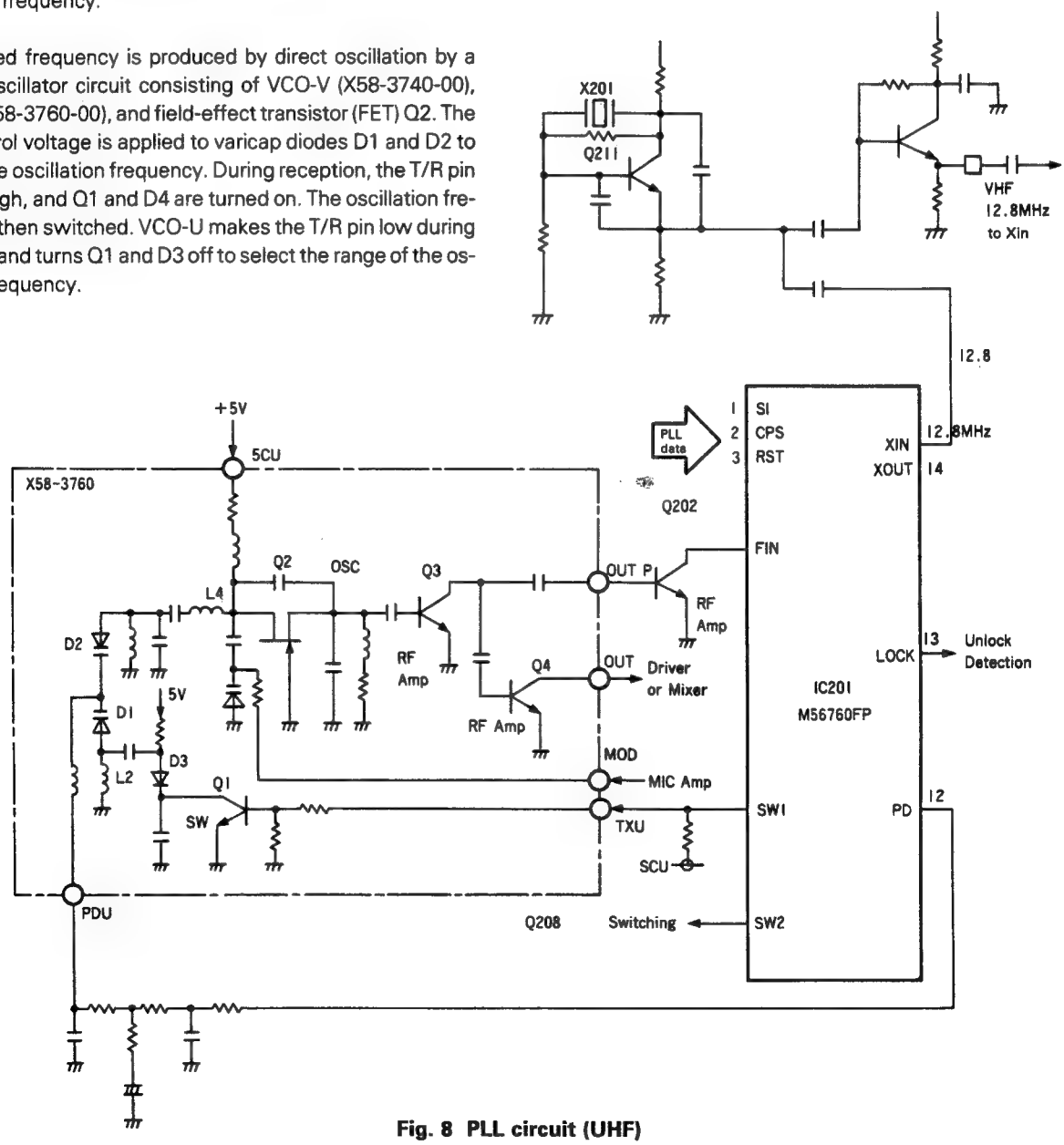


Fig. 8 PLL circuit (UHF)

CIRCUIT DESCRIPTION

(7) Microcomputer and Peripheral Circuits

7-1 Reset and Backup Circuits

A low pulse of approximately 1 ms duration is output from reset circuits C76 and Q19 when the B power is turned on. Microcomputer IC10 is then reset. When the B power is turned off, voltage detector circuit IC9 detects the 5-V line drop and changes the output signal from high to low. The microcomputer enters the backup mode when microcomputer port INT4 is made low. Microcomputer IC12 is reset by microcomputer IC10.

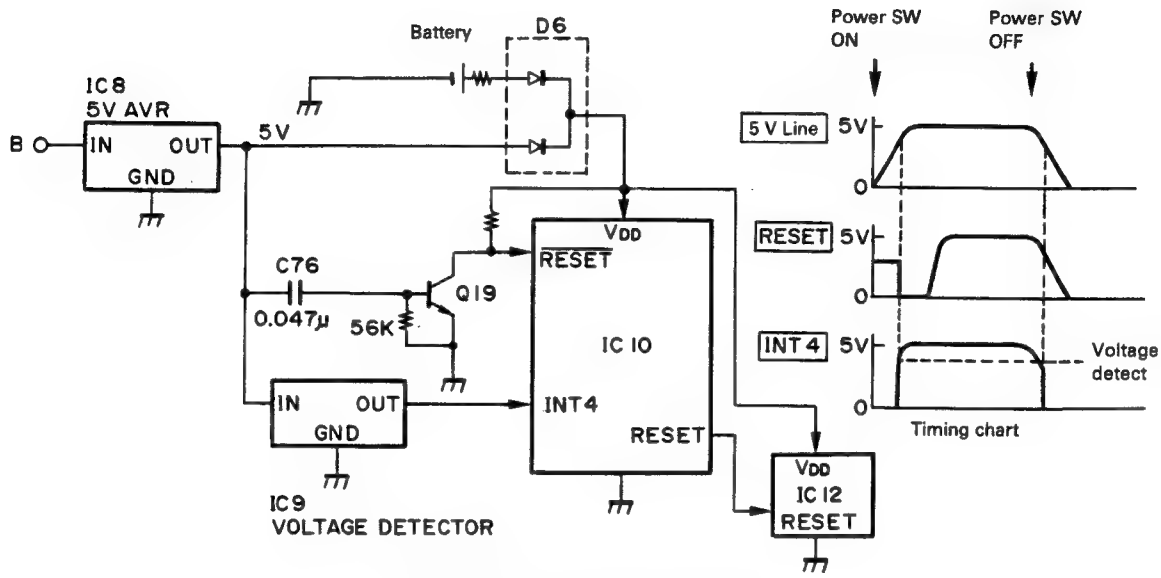


Fig. 10 Reset and backup circuit

CIRCUIT DESCRIPTION

7-2 DTMF and DTSS/PAGING

7-2-1 DTMF encode

A DTMF signal is directly produced using the TOR and TOC signals of IC12. The frequency-response characteristic of the DTMF signal is compensated for by C58, R48, and VR5. The resultant DTMF signal is level-adjusted, then input to pin 3 of IC1. The DTMF monitor signal is sent to the input pins of the main and sub high-pass filters. The audio frequency is muted by IC3.

7-2-2 DTMF decode

The AFV and AFU signals are split up and sent to the CTCSS unit and DTMF decoder by IC2, then sent to IC11. IC11 outputs the code corresponding to the DTMF signal from pins 11 through 14. The output code is compared with the DTSS and PAGING codes by IC10, which determines whether they match.

7-2-3 DTMF decode timing

The main band and sub-band are activated by one DTMF decoder. For a single band, only the main band is checked. For a dual band, the DTMF decoder is switched into the band carrying a BUSY signal to check the band. The other band may not be checked when a BUSY signal is carried in the main band and sub-band at the same time.

7-3 LED Drive Circuit

The LMP pin of IC12 is made high when the lamp switch is pressed. The constant-current circuit consisting of D7, Q21, and R116 is then turned on. As a result, a constant current (40 mA) flows through the LED even if the supply voltage fluctuates.

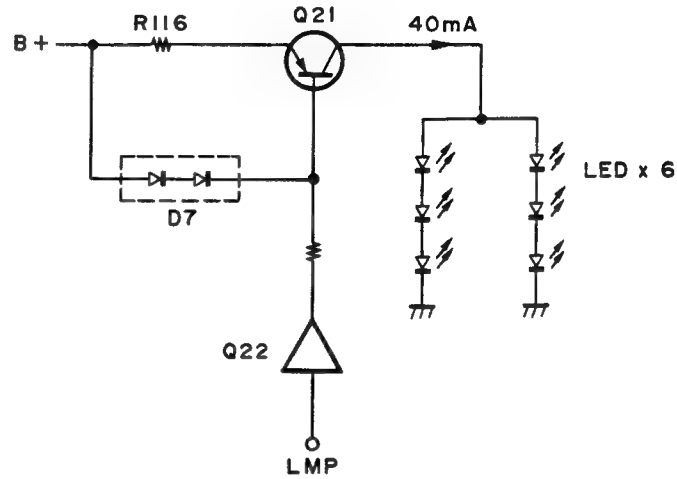


Fig. 12 Lamp circuit

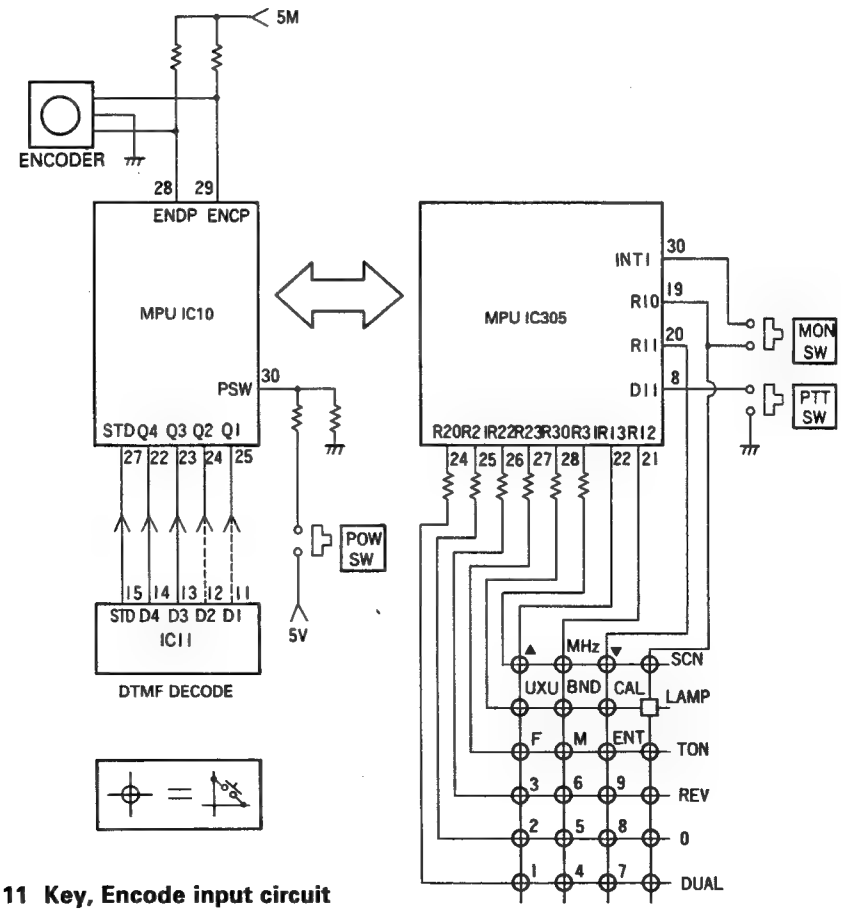
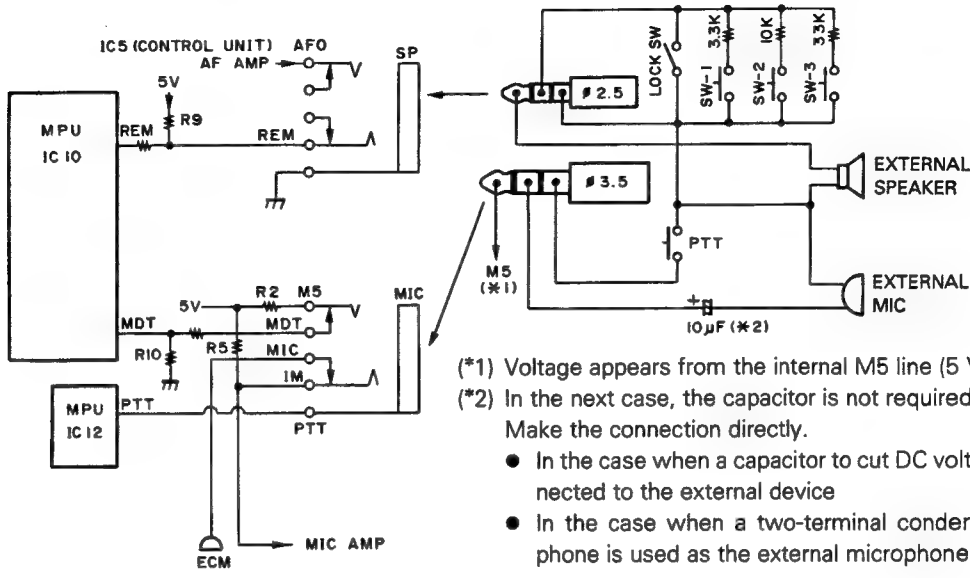


Fig. 11 Key, Encode input circuit

CIRCUIT DESCRIPTION

7-4 Remote Control Microphone Circuit

The remote control microphone circuit has two internal audio amplifiers. The external speaker is directly connected to IC5 via the AFO pin. The speaker microphone and speaker plug connections are detected using the REM and MDT signals. The REM and MDT signals are made high when the speaker microphone and speaker plug are not connected. The REM and MDT signals are then output from IC6 to the internal speaker. An audio signal is output to the external speaker when the MDT or REM signal is set low.



(*1) Voltage appears from the internal M5 line (5 V) via R2.
(*2) In the next case, the capacitor is not required.
Make the connection directly.

- In the case when a capacitor to cut DC voltage is connected to the external device
- In the case when a two-terminal condenser microphone is used as the external microphone

Fig. 13 Speaker, Microphone, Remote circuit

7-5 CTCSS Operation

The CTCSS in the main band and sub-band is checked by the CTCSS timing unit. Only the main band is checked when a single band is used. The band carrying a BUSY signal is checked when a dual band is used with the main band and sub-band CTCSS set on. The main band and sub-band are checked every 500 ms when they carry a BUSY signal. During full-duplex operation, the CTCSS in the main band outputs a subtone when the TONE and CTCSS signals are on. Turns the CTCSS in the subband cannot be checked. In that case, the squelch in the subband is opened or closed using only the BUSY signal. For the band in which the CTCSS cannot be checked, the "CT" display disappears only during transmission.

CTCSS CHECK TIMING (MAIN, SUB CTCSS ON)

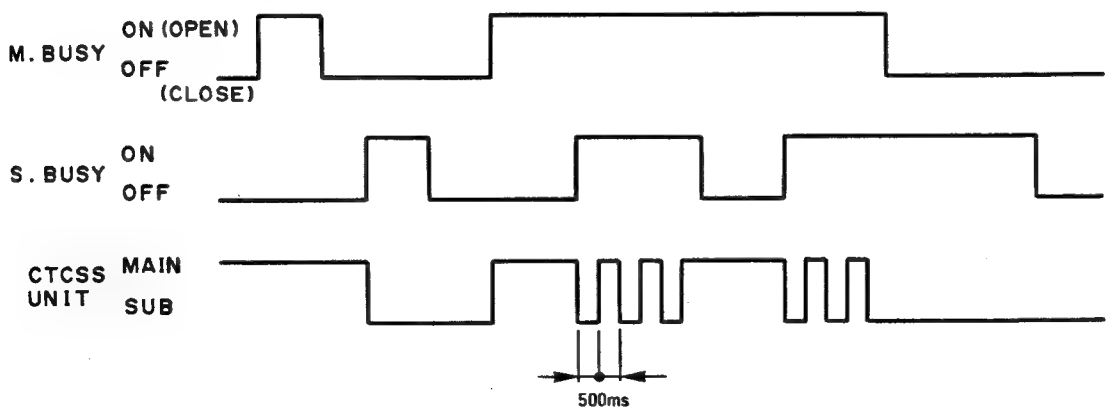


Fig. 14 CTCSS timing chart

Device Functions

1. Control Unit (X53-333X-XX)

Reference No.	Function	Description
Q1	5RUC/5RUOM switch	5RUC: Power switch in the stage after the UHF receiver mixer
Q2	5RV/5CV switch	5RV: VHF receiver RF amplifier/mixer power switch 5CV: VHF PLL power switch
Q3	5RVC/5RU switch	5RVC: Power switch in the stage after the VHF receiver mixer 5RU: UHF receiver RF amplifier power switch
Q4	5RVOM/5CU switch	5RVOM: Subband UHF receiver power switch 5CU: UHF PLL power switch
Q5	5C/5R AVR	
Q6	5C/5R AVR error amplifier	The amplifier is turned on when Q7 is turned on or off.
Q7	Save operation switch	1/2: Off during save operation. 2/3: On during transmission.
Q8	5T AVR	
Q9	5T AVR error amplifier	The amplifier is turned on when Q7 is turned on or off.
Q10	5TV switch	On during VHF transmission.
Q11	Microphone input shorting switch	On while DTMF signal is modulated.
Q12	Modulation output band switch	
Q13	CTCSS input selection control	
Q14	Main audio high-pass filter	
Q15	Sub-audio high-pass filter	
Q16	AF amplifier regulator	
Q17	AF amplifier regulator	
Q18	AF regulator switch	On when AF signal is output.
Q19	Microcomputer reset switch	Low for 1 ms when external power is supplied.
Q20	5M/CTCSS power switch	1/2: Power circuit reference voltage on/off 2/2: On during CTCSS operation.
Q21	Lamp LED constant-current source	
Q22	Q21 switch	On when lamp lights.
Q23	DTMF decoder input selection control	
Q24	5TU switch	On during UHF transmission.
D1	Power reverse-connection protection diode	
D2	AF IC BY pin voltage drop prevention	
D3	AF IC BY pin voltage drop prevention	
D4	AF IC AVR time-constant control	
D5	AF IC BY pin reverse-flow prevention	
D6	Microcomputer backup battery selection	
D7	Constant-current circuit reference voltage	
D8	Backlight LED	
D9	Backlight LED	
D10	Backlight LED	
D11	Backlight LED	
D12	Backlight LED	
D13	Backlight LED	
D14	Electrostatic surge absorption	
IC1	Microphone amplifier	
IC2	DTMF/CTCSS decode selection	
IC3	Selection of AF signal to main band and sub-band	
IC4	Selection of AF signal to internal/external AF amplifier	
IC5	External audio power amplifier	Connected to external speaker socket.
IC6	Internal audio power amplifier	Connected to internal speaker.

Device Functions

Reference No.	Function	Description
IC7	Cross-band repeater AF switch	AF output signal in sub-band is input to microphone amplifier.
IC8	5-V regulator	Used for microcomputer and power circuit reference voltages.
IC9	Backup detection	
IC10	Microcomputer	Power and signaling control
IC11	DTMF decoder IC	
IC12	Microcomputer	Display, key entry, and DTMF signal generation
IC13	CTCSS unit power	

Device Functions

2. TX-RX Unit (X57-3630-XX)

Reference No.	Function	Description
Q1	VCO ripple filter amplifier	
Q2	PLL buffer amplifier	
Q3	VHF driver initial stage	
Q4	VHF driver final stage	Output level: 14 to 15 dBm (typical)
Q5	IF post-amplifier	
Q6	VHF receiver mixer	
Q7	VHF receiver amplifier	
Q8	Power switch	Air band is on. AMR band is off
Q9	Power switch	
Q10	Power switch	Sub-UHF power
Q11	Squelch switch	Turned on or off using noise detection output signal.
Q12	Squelch and hysteresis switches	Turned on or off using output signal of Q11.
Q13	Noise amplifier	
Q201	VCO ripple filter amplifier	
Q202	PLL buffer amplifier	
Q203	UHF driver initial stage	
Q204	UHF driver final stage	Output level: 12 to 13 dBm (typical)
Q205	UHF receiver mixer	
Q206	UHF receiver amplifier second stage	
Q207	UHF receiver amplifier initial stage	
Q208	Power switch	360/800 daughter power switch
Q209	Power switch	360/800 daughter power switch
Q210	IF post-amplifier	
Q211	PLL reference oscillator	
Q212	PLL reference output VHF buffer amplifier	
D1	Ripple filter speed-up	
D2	VCO output selection switch	
D3	APC ATT pin diode	
D4	Antenna switch	
D5	Antenna switch	
D6	Power protection	Internal surge protection
D8	VCO output selection switch	
D9	AGC control diode	IC2 input pin voltage control (for air band)
D10	Receiver filter band shift	
D11	Receiver filter band shift	
D12	Receiver filter band shift	
D13	Sub-UHF power reverse-current prevention	
D15	Power switch reverse-current prevention	
D16	Squelch/noise detection	
D201	Ripple filter speed-up	
D202	VCO output selection switch	
D203	Driver final-stage bias	
D204	Antenna switch	
D205	Antenna switch	
D206	Antenna switch	
D207	VCO output selection	
D208	360/800 power line reverse-current prevention	
D209	UHF power line reverse-current prevention	
D210	Mixer input selection switch	

Device Functions

Reference No.	Function	Description
D211	Mixer input selection switch	
D212	Sub-UHF power line reverse-current prevention	
D213	Receiver block high-input protection	
D214	VCO output selection switch	
D215	360 input selection switch	
D216	VCO output selection switch	
IC1	VHF PLL circuit	
IC2	VHF FM IF system circuit	
IC3	VHF RF power amplifier module	
IC201	UHF PLL circuit	
IC202	UHF FM IF system circuit	

Daughter 1 Unit (X58-3770-00)

Reference No.	Function	Description
Q1	APC constant-current source	
Q2	UHF mid-power setting voltage switch	Jumpers VR1.
Q3	UHF low-power setting voltage switch	Jumpers R11 and VR1.
Q4	APC error amplifier power switch	Turned on using 5TV and 5TU signals.
Q5	Band selection switch (UHF)	Turns the setting voltage on or off with a variable resistor.
Q6	Band selection switch (VHF)	Turns the setting voltage on or off with a variable resistor.
Q7	VHF mid-power setting voltage switch	Jumpers VR3.
Q8	VHF low-power setting voltage switch	Jumpers R19 and VR3.
Q201	Sub-UHF RF amplifier	
Q202	Sub-UHF mixer	
Q301	UHF squelch noise amplifier	
Q302	UHF SCU and hysteresis switches	
Q303	UHF squelch switch	
D1	APC reference voltage generation	
D2	High/Middle/Low selection	5TV and 5TU reverse-current prevention
D3	High/Middle/Low selection	5TV/5TU reverse-current prevention
D101	UHF APC ATT pin diode	
D201	Amplifier high-input signal protection	
D301	UHF noise detection	
IC101	UHF power amplifier module	
IC1	APC error amplifier	

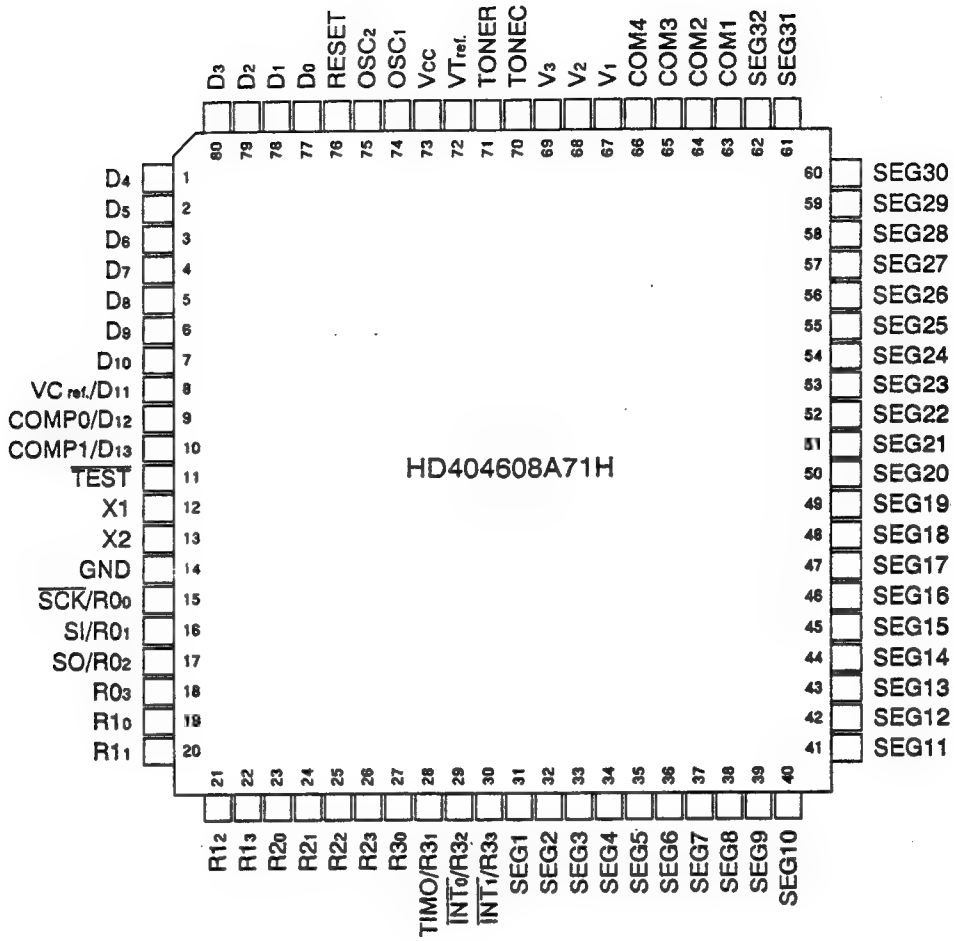
Daughter 2 Unit (X59-3810-00)

Reference No.	Function	Description
Q1	800 RF amplifier	
Q2	Local oscillator doubler	
Q3	Mixer	
Q101	AGC level shift	
Q102	Air band AF amplifier	
Q103	FM discrete short-circuit	
IC101	AM receiver circuit	

SEMICONDUCTOR DATA

Microcomputer HD404608A71H (Control Unit IC12)

●Pin Functions



SEMICONDUCTOR DATA

Microcomputer HD404608A71H (Control Unit IC12)

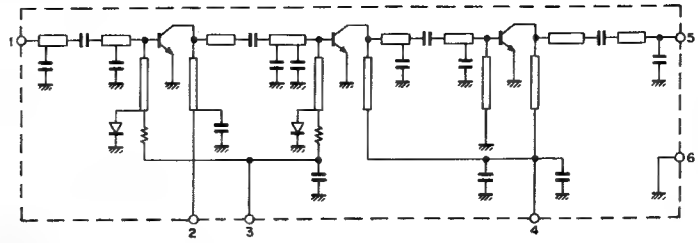
●Pin Functions

Pin No.	Name	I/O	Description
1	D4	O	Transmission power selection Low: H; Middle: H; High: L
2	D5	O	CTCSS (TSU-7) power on/off "H": Off; "L": On
3	D6	O	Cross-band repeater on/off "L": Off; "H": On
4	D7	I	Destination input
5	D8	I	Destination input
6	D9	I	Destination input
7	D10	I	Destination input
8	D11/VCref	I	PTT switch input
9	D12/COMP0	I	Serial interface transmission request input "H": Active
10	D13/COMP1	I	Serial interface serial busy input "H": Active
15	R00/SCK		Serial interface clock
16	R01/SI		Serial interface serial input
17	R02/SO		Serial interface serial output
18	R03	O	Microphone muting "L": Off; "H": On
19	R10	O	Key matrix output
20	R11	O	Key matrix output
21	R12	O	Key matrix output
22	R13	O	Key matrix output
23	R20	I	Key matrix output
24	R21	I	Key matrix output
25	R22	I	Key matrix output
26	R23	I	Key matrix output
27	R30	I	Key matrix output
28	R31/TIMO	I	Key matrix output
29	R32/INT0	I	Backup control
30	R33/INT1	I	Key matrix input
74	OSC1		System lock
75	OSC2		System lock
77	D0	O	Lamp on/off output "H": On; "L": Off
78	D1	O	VHF modulation output on/off "H": Off; "L": On
79	D2	O	UHF modulation output on/off "H": Off; "L": On
80	D3	O	Transmission power selection Low: H; Middle: L; High: L

SEMICONDUCTOR DATA

UHF power module: S-AU26 (SUB unit IC101)

• **Equivalent circuit**



1 : High-frequency input (Pi)
2 : VCON pin (V1)
3 : VBB bias pin (V2)
4 : Vcc pin (V3)
5 : High-frequency output (Po)
6 : Ground (flange)

• **Maximum rating (Tc = 25°C)**

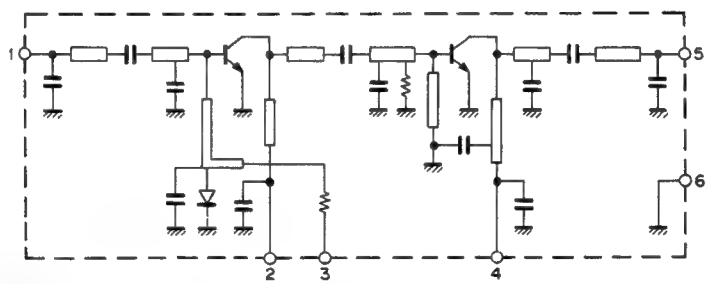
Item	Symbol	Condition	Rating	Unit
Power supply voltage	Vcc	Zg = Zl = 50Ω	15	V
Control voltage	VCON		15	V
Bias voltage	VBB		5.5	V
Input voltage	Pi		24	mW
Output voltage	Po		10	W
Total current	IT		4	A
Case temperature during operation	Tc(opr)	–	-30 ~ +100	°C
Storage temperature	Tstg	–	-40 ~ +110	°C

• **Electrical characteristics**

Item	Symbol	Measurement condition		Min	Typ	Max	Unit
Frequency range	frange	–		430	–	450	MHz
Output power	Po(1)	Pi = 12mW VBB = 5V Zg = Zl = 50Ω	Vcc = VCON = 12.5V	7	–	–	W
Total efficiency	ηT			36	–	–	%
Secondary harmonics	HRM(1)			–	–	-15	dBc
Tertiary harmonics	HRM(2)			–	–	-30	dBc
Output power at low voltage	Po(2)		Vcc = VCON = 8V	3	–	–	W
	Po(3)		Vcc = VCON = 6.4V	1.5	–	–	W

VHF power module: S-AV22 (TX-RX unit IC3)

• **Equivalent circuit**



1 : High-frequency input (Pi)
2 : VCON pin (V1)
3 : VBB bias pin (V2)
4 : Vcc pin (V3)
5 : High-frequency output (Po)
6 : Ground (flange)

• **Maximum rating (Tc = 25°C)**

Item	Symbol	Condition	Rating	Unit
Power supply voltage	Vcc	Zg = Zl = 50Ω	15	V
Control voltage	VCON		15	V
Bias voltage	VBB		5.5	V
Input voltage	Pi		30	mW
Output voltage	Po		10	W
Total current	IT		4	A
Case temperature during operation	Tc(opr)	–	-30 ~ +100	°C
Storage temperature	Tstg	–	-40 ~ +110	°C

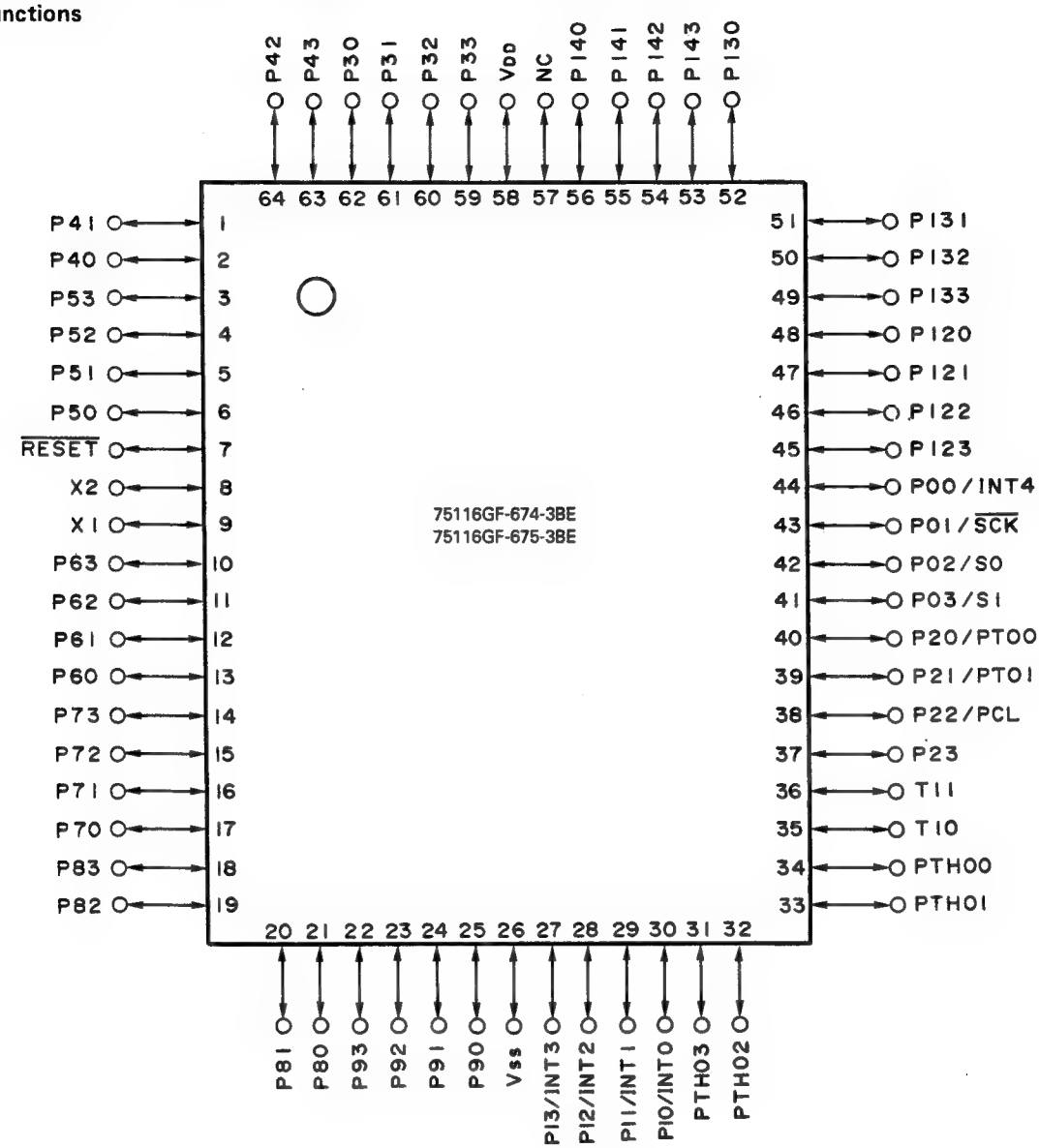
• **Electrical characteristics**

Item	Symbol	Measurement condition		Min	Typ	Max	Unit
Frequency range	frange	–		144	–	148	MHz
Output power	Po(1)	Pi = 15mW VBB = 5V Zg = Zl = 50Ω	Vcc = VCON = 12.5V	7	–	–	W
Total efficiency	ηT			40	–	–	%
Secondary harmonics	HRM(1)			–	–	-15	dBc
Tertiary harmonics	HRM(2)			–	–	-25	dBc
Output power at low voltage	Po(2)		Vcc = VCON = 8V	3.5	–	–	W
	Po(3)		Vcc = VCON = 6.4V	1.5	–	–	W

SEMICONDUCTOR DATA

Microcomputer 75116GF-674-3BE (Control unit IC10): M, X, T, E
75116GF-675-3BE (Control unit IC10): K, P

•Pin Functions



SEMICONDUCTOR DATA

Microcomputer 75116GF-674-3BE (Control Unit IC10): M, X, T, E
75116GF-675-3BE (Control Unit IC10): K, P

●Pin Functions

Pin No.	Name	I/O	Description
1	P41	O	Serial interface busy output
2	P40	O	Serial interface transmission request output
3	P53	O	Encoder clock
4	P52	O	Encoder clock
5	P51	O	Transmission power supply "L": On
6	P50	O	Main band or sub-band selection
7	RST	I	Reset input
8	X2		Crystal oscillator input
9	X1		Crystal oscillator input
10	P63	O	DTMF decoder input selection
11	P62	I	CTCSS tone detection
12	P61	I	VHF UNLOCK input
13	P60	I	UHF UNLOCK input
14	P73	O	VHF PLL enable
15	P72	O	UHF PLL enable
16	P71	O	Data
17	P70	O	Clock
18	P83	O	Clock
19	P82	O	Clock
20	P81	O	Clock
21	P80	O	AF output selection
22	P93	I	AF output selection
23	P92	I	AF output selection
24	P91	I	AF output selection
25	P90	I	DTMF decoder data input
27	INT3 P13	I	DTMF decoder tone detection (STD)
28	INT2 P12	I	Encoder data
29	INT1 P11	I	Encoder clock
30	INT0 P10	I	Power switch
31	PTH03	I	Remote control analog input
32	PTH02	I	Battery analog input
33	PTH01	I	Signal strength meter UHF analog input
34	PTH00	I	Signal strength meter VHF analog input
35	T10	I	UHF squelch input
36	T11	I	VHF squelch input
37	P23	O	DTMF data enable
38	PCL P22	O	DTMF power switch "L": Active
39	PTO1 P21	O	TSU-7 data enable
40	PTO0 P20	O	Beep sound and 1750 Hz tone output
41	SI P03		Serial interface serial input
42	SO P02		Serial interface serial output
43	SCK P01		Serial interface clock
44	INT4 P00	I	Power detection "H": On; "L": Off
45	P123	O	5M power supply "L": On
46	P122	O	AF power supply "L": On
47	P121	O	VHF transmission "L": On
48	P120	O	UHF transmission "L": On
49	P133	O	Transmission power supply "L": On
50	P132	O	Save "H": On

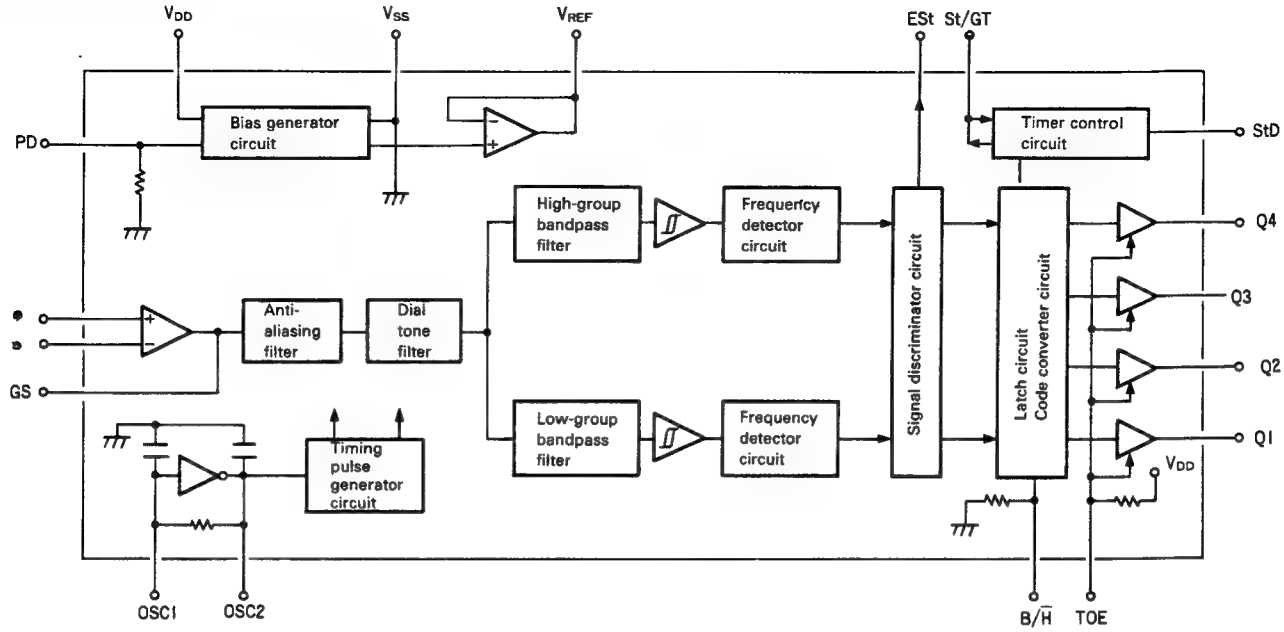
SEMICONDUCTOR DATA

Pin No.	Name	I/O	Description
51	P131	O	UHF PLL power supply "L": On
52	P130	O	VHF additional reception (AIR, SUB-UHF) "L": On
53	P143	O	UHF amateur reception "L": On
54	P142	O	VHF band reception "L": On
55	P141	O	VHF PLL power supply "L": On
56	P140	O	VHF amateur reception "L": On, On during AM reception
59	P33	O	UHF band additional reception (360, 800) "L": On
60	P32	O	UHF band reception "L": On
61	P31	I	Speaker microphone connection check "L": Connected
62	P30	O	TSU-7 decoder input selection
63	P43	O	HD404608 reset "H": Reset
64	P42	O	HD404608 INT0 "L": Active

SEMICONDUCTOR DATA

DTMF Decoder LC7385M (Control Unit IC11)

●Block Diagram



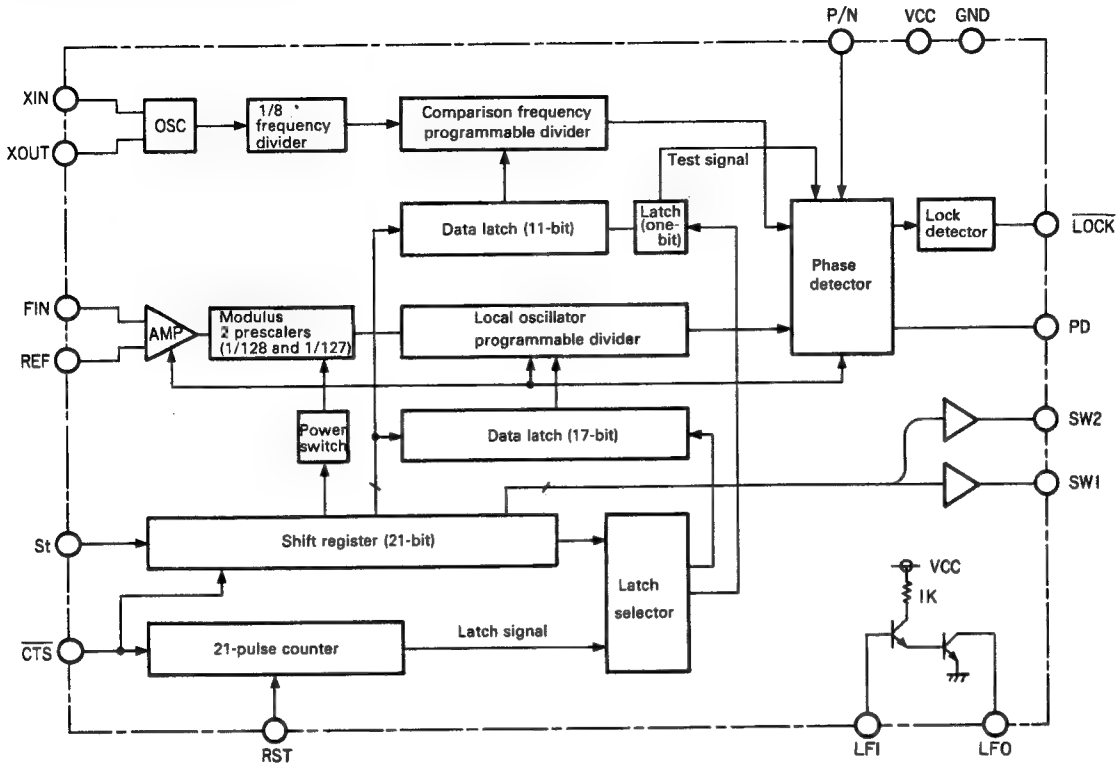
●Pin Functions

Pin No.	Name	I/O	Description
1	IN+	I	Input amplifier non-inverting input
2	IN−	I	Input amplifier inverting input
3	GS	O	Input amplifier output
4	V_{REF}	O	VDd/2 reference voltage output
5	B/H	I	Selects the output formats of Q1 to Q4. Hexadecimal when low. Binary (two of eight code) when high.
6	PD	I	Power-down mode when high.
7	OSC1	I	Crystal oscillators producing 3.57954 and 3.579545 MHz are connected between the OSC1 and OSC2 pins to constitute an oscillator circuit.
8	OSC2	O	
9	V_{SS}		Power pin. Usually set to 0 V.
10	TOE	I	Controls the tristate outputs of Q1 to Q4. Enabled when high; high impedance when low.
11	Q1	O	Tristate received data output
12	Q2		
13	Q3		
14	Q4		
15	StD	O	High when the continuation time of a valid tone pair exceeds the time set by the external CR.
16	ESt	O	Set high when a valid tone pair is detected.
17	St/GT	I/O	Connected CR sets the guard time.
18	V_{DD}		Power pin. Usually set to 5 V.

SEMICONDUCTOR DATA

PLL Circuit M56760FP (TX-RX Units IC1 and IC201)

●Block Diagram



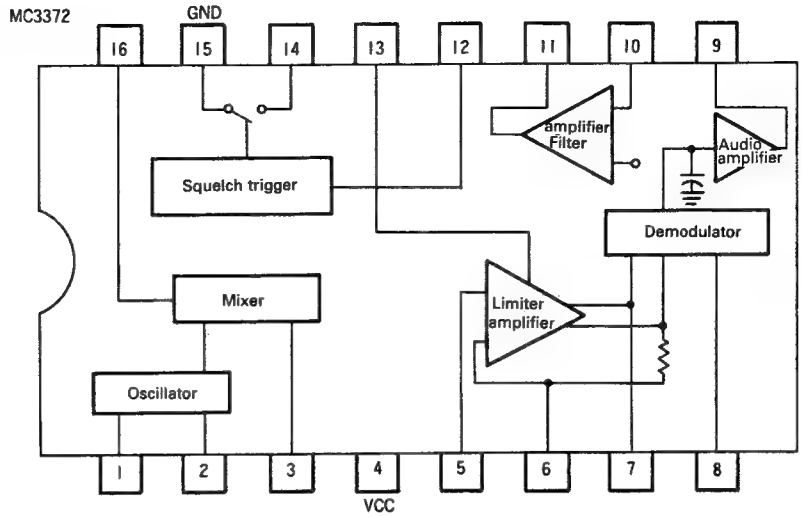
●Pin Functions

No.	Symbol	Pin name	Description
1	SI	Data input	Shift register data input
2	CPS	Clock pulse input	Shift register clock pulse input
3	RST	Reset pulse input	21-pulse counter reset pulse input
4	REF	Reference bias	Grounded by a 1000 pF capacitor.
5	FIN	Local oscillator input	Local oscillator frequency (VCO) input. 540 MHz (max)
6	SW1	Output port 1	The output port status can be set by the transfer data from the controller.
7	SW2	Output port 2	
8	GND	Ground	Ov
9	P/N	Phase detector polarity selection input	The PD pin is high during phase advance when high, and low during phase delay. It is low during phase advance when low, high during phase delay.
10	LFO	Filter output	Low-pass filter transistor collector output
11	LFI	Filter input	Low-pass filter transistor base input
12	PD	Phase detection output	Tristate output
13	LOCK	Lock detection output	"L": during PLL lock, "H": during unlock. Open collector
14	XOUT	Crystal oscillator input	The output of a 12.8-MHz reference oscillator is input to the XIN pin. An external crystal can also be used.
15	XIN		
16	V_{CC}	Power	3.0~5.5 V

SEMICONDUCTOR DATA

FM Receiver Circuit MC3372D (TX-RX Units IC2 and IC202)

●Block Diagram



●Pin Functions

Pin No.	Name	Description
1	OSC In	A Colpitts oscillator circuit is set up by connecting a crystal oscillator. A signal is input to pin 1, and pin 2 is connected to Vcc when an external oscillator is used.
2	OSC Out	
3	MIX Out	Mixer output
4	Vcc	Power
5	LIM In	Limiter amplifier input and decoupling (or output). Pins 6 and 7 are AC-grounded (or a feedback resistor and phase meter capacitor are connected to pin 7).
6	DEC1	
7	DEC2 (LIM Out)	
8	QUAD In	Phase meter connection
9	AF Out	An FM detected signal is output.
10	FAmp. In	Operational amplifier inverting input
11	FAmp. Out	Operational amplifier output
12	SQSW In	Squelch switch input
13	Smeter Out	A current corresponding to the limiter amplifier input signal level is output.
14	SQSW Out	Squelch switch output
15	GND	Ground
16	MIX In	Mixer input

Note: The explanation in parentheses refers to FM receiver circuit MC3372.

PARTS LIST

* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Telle ohne Parts No. werden nicht geliefert.

Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
TH-77A/E						
1	3B	*	A01-2004-02	METALLIC CABINET(REAR)		
2	1A	*	A02-0975-03	PLASTIC CABINET ASSY(FRONT)	KMXP	
2	1A	*	A02-0976-03	PLASTIC CABINET ASSY(FRONT)	TE1E2	
3	2A	*	A22-0772-03	SUB PANEL		
4	1A	*	A40-0627-04	BOTTOM PLATE		
5	3B	*	B09-0323-03	CAP((SP/MIC/DC)		
6	1A	*	B11-0486-03	FILTER		
			B42-2437-04	S/NO LABEL		
			B42-3394-04	LABEL(LA)	K	
			B44-2163-04	LABEL(UPC)		
13		*	B62-0007-00	INSTRUCTION MANUAL	KTX	
13		*	B62-0008-00	INSTRUCTION MANUAL	MPE1E2	
60		*	B62-0017-00	INSTRUCTION MANUAL	E1E2	
		*	B72-0015-04	MODEL NAME PLATE	KP	
		*	B72-0016-04	MODEL NAME PLATE	MX	
		*	B72-0017-04	MODEL NAME PLATE	TE1E2	
10			B46-0410-20	WARRANTY CARD	K	
10			B46-0419-00	WARRANTY CARD	E1E2	
10			B46-0422-00	WARRANTY CARD	P	
15	3B	*	E04-0181-05	RF COAXIAL CABLE RECEPT(BNC)		
57			E19-0254-05	PLUG(CHARGER)	M	
16	2B	*	E23-0653-04	TERMINAL(DC +)		
17	1B	*	E23-0654-04	TERMINAL(DC -)		
		*	E37-0050-05	SP WIRE		
19			F07-0896-13	COVER(BM-1)		
20		*	F07-1202-03	COVER(KEY)		
21	2B	*	F10-1450-02	SHIELDING PLATE(UHF)		
22	1A		F19-0666-04	BLIND PLATE(MIC)		
			F20-1024-24	INSULATING BOARD(JACK)		
		*	F20-1046-04	INSULATING BOARD(LCD)		
		*	F20-1047-04	INSULATING BOARD(BOTTOM)		
		*	F20-1067-04	INSULATING BOARD		
			F29-0435-05	INSULATOR(BELT HOOK)	K	
28	1A		G02-0505-05	KNOB FIXED SPRING(VOR,ENC)		
		*	G10-0635-04	FORMED PLATE(CONT)		
			G10-0692-04	FORMED PLATE(TONE)	KP	
31	1B	*	G13-0965-04	FORMED PLATE(DC TERMINAL)		
		*	G13-1304-04	CUSHION(ENCODER)		
33	2A	*	G53-0596-03	PACKING(SUB PANAL)		
		*	H10-2695-02	POLYSTYRENE FOAMED FIXTURE		
35			H11-0808-14	POLYSTYRENE PLATE(TOP)	KTX	
59			H11-0840-04	POLYSTYRENE PLATE	X	
36			H13-0818-04	POLYSTYRENE PLATE(BELT HOOK)		
35			H13-0823-04	POLYSTYRENE PLATE	MP	
37			H13-0841-04	POLYSTYRENE PLATE(CHARGER)	KMTP	
37			H13-0841-04	POLYSTYRENE PLATE(CHARGER)	E1E2	
55		*	H21-0719-04	PACKING		
40			H25-0085-04	PROTECTION BAG		
41		*	H52-0009-04	ITEM CARTON BOX(TH-77A)	KP	
41		*	H52-0010-04	ITEM CARTON BOX(TH-77A)	MX	
41		*	H52-0011-04	ITEM CARTON BOX(TH-77E)	TE1E2	

E: Scandinavia & Europe K: USA P: Canada W:Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE : AAFES(Europe) X: Australia

TH-77A: K, P, M, X
TH-77E: T, E1, E2

⚠ indicates safety critical components.

PARTS LIST

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42	1B	*	J19-1460-03	HOLDER(BATTERY TERMINAL)		
43	2A	*	J21-4313-04	MOUNTING HARDWARE(BOTTOM CASE)		
44			J29-0424-04	BELT HOOK(ACSY)		
45	1A		J39-0440-14	SPACER(MIC)		
46			J69-0312-04	HAND STRAP(ACSY)		
47	1A		K29-4564-04	KNOB ASSY(RELEASE)		
48	1A	*	K29-4569-04	KNOB ASSY(ENCODER)		
49	1A	*	K29-4570-04	KNOB ASSY(VOL)		
50	1A	*	K29-4571-04	KNOB ASSY(SQL)		
51	3B	*	K29-4572-03	KNOB ASSY(PTT)		
52	1A	*	K29-4574-03	KNOB ASSY(KEY TOP)		
A	2A		N09-2009-15	SCREW(2X4.5)		
B	3B		N09-2024-05	SCREW(2X16)		
			N09-2028-05	SCREW(M3X4) BELT HOOK		
D	1B,3B		N09-2064-05	SCREW(M2X3.5)		
E	2A.2B	*	N09-2128-05	SCREW(2X4)		
F	1A	*	N09-2129-05	SCREW(M2X5)		
J	2B	*	N09-2139-05	SCREW(2X10.5)		
G	1A		N14-0534-04	NUT(VOL,ENC)		
H	3B	*	N30-2605-45	PAN HEAD MACHINE SCREW		
I	2B	*	N30-2614-46	PAN HEAD MACHINE SCREW		
SP	1A	*	T07-0266-05	LOUDSPEAKER(FULLRANGE)		
54		*	T90-0414-05	ANTENNA(ACSY)		
58			W09-0385-05	BATTERY CHARGER (120V)	P	
58			W09-0317-15	BATTERY CHARGER(220V)	E1E2	
58			W09-0318-15	BATTERY CHARGER(240V)	T	
58			W09-0382-15	BATTERY CHARGER(120V)	K	
56			W09-0507-05	BATTERY PACK(PB-6)	KP	
58		*	W09-0527-05	BATTERY CHARGER(240V)	X	
58			W09-0534-05	BATTERY CHARGER(120/230V)	M	
56			W09-0535-05	BATTERY PACK(PB-10)	MXTE	
			X52-3170-00	CTCSS UNIT(TSU-7)	KP	
		*	X53-3330-11	CONTROL PC BOARD ASSY	KP	
		*	X53-3330-21	CONTROL PC BOARD ASSY	M	
		*	X53-3330-51	CONTROL PC BOARD ASSY	TE1	
		*	X53-3330-71	CONTROL PC BOARD ASSY	X	
		*	X53-3332-71	CONTROL PC BOARD ASSY	E2	
		*	X57-3630-11	TX-RX PC BOARD ASSY	KP	
		*	X57-3630-21	TX-RX PC BOARD ASSY	MTXE	
CONTROL UNIT (X53-333X-XX) (-11 : K, P; -21 : M; -51 : T, E1; -71 : X; 2-71 : E2)						
A1		*	B38-0338-05	DISPLAY ASSY		
C1			CC73GSL1H101J	CHIP C 100PF J		
C2			CK73EB1H471K	CHIP C 470PF K		
C3			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C4			CK73FB1E104K	CHIP C 0.10UF K		
C5 -15			CK73GB1H471K	CHIP C 470PF K		
C16			C92-0047-05	ELECTRO 47UF 6.3WV		
C17 -22			CK73GB1H471K	CHIP C 470PF K		
C23			C92-0519-05	CHIP-TAN 1UF 25WV		
C25			CE04NW1C101M	ELECTRO 100UF 16WV		
C26 -28			CK73GB1H471K	CHIP C 470PF K		
C29 ,30			CK73GB1H471K	CHIP C 470PF K		
C31			C92-0047-05	ELECTRO 47UF 6.3WV		

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C32			C92-0519-05	CHIP-TAN	1UF 25WV		
C33			CK73GB1H471K	CHIP C	470PF K		
C35 -38			CK73GB1H471K	CHIP C	470PF K		
C39			CK73GB1E103K	CHIP C	0.010UF K		
C40			CK73GB1H471K	CHIP C	470PF K		
C41			CK73GB1E103K	CHIP C	0.010UF K		
C42			C92-0002-05	CHIP-TAN	0.22UF 35WV		
C43			CK73FB1E223K	CHIP C	0.022UF K		
C45			C92-0005-05	CHIP-TAN	2.2UF 6.3WV		
C46			CK73GB1E103K	CHIP C	0.010UF K		
C47			CK73GB1H471K	CHIP C	470PF K		
C48			C92-0005-05	CHIP-TAN	2.2UF 6.3WV		
C49			CK73GB1H471K	CHIP C	470PF K		
C50			CC73GCH1H151J	CHIP C	150PF J		
C51			CK73GB1H182K	CHIP C	1800PF K		
C52			CK73GB1E103K	CHIP C	0.010UF K		
C53			C92-0507-05	CHIP-TAN	4.7UF 6.3WV		
C54			C92-0517-05	CHIP-TAN	2.2UF 4WV		
C55 ,56			CK73GB1H471K	CHIP C	470PF K		
C57			CK73GB1E103K	CHIP C	0.010UF K		
C58			CK73GB1H472K	CHIP C	4700PF K		
C59			CK73GB1H102K	CHIP C	1000PF K		
C60 ,61			CK73GB1H471K	CHIP C	470PF K		
C62			CK73FB1E223K	CHIP C	0.022UF K		
C63			CK73FB1E473K	CHIP C	0.047UF K		
C64			C92-0517-05	CHIP-TAN	2.2UF 4WV		
C65			CK73FB1E473K	CHIP C	0.047UF K		
C66			CK73GB1H471K	CHIP C	470PF K		
C67			CK73FB1E104K	CHIP C	0.10UF K		
C69			CK73FB1E223K	CHIP C	0.022UF K		
C70 ,71			CK73FB1E473K	CHIP C	0.047UF K		
C72			CK73GB1H471K	CHIP C	470PF K		
C73			CK73FB1E104K	CHIP C	0.10UF K		
C74			CK73GB1H471K	CHIP C	470PF K		
C76			CK73FB1E473K	CHIP C	0.047UF K		
C77 -79			CK73GB1H471K	CHIP C	470PF K		
C80			CK73GB1H472K	CHIP C	4700PF K		
C81			C92-0507-05	CHIP-TAN	4.7UF 6.3WV		
C82			C90-2052-05	ELECTR®	68UF 10WV		
C83			CK73FB1E473K	CHIP C	0.047UF K		
C84			CK73GB1H471K	CHIP C	470PF K		
C85			CK73GB1H822K	CHIP C	8200PF K		
C86			CE04NW1A470M	ELECTR®	47UF 10WV		
C87			CK73GB1H471K	CHIP C	470PF K		
C88			C92-0507-05	CHIP-TAN	4.7UF 6.3WV		
C89			CE04NW0J470M	ELECTR®	47UF 6.3WV		
C90			C90-2052-05	ELECTR®	68UF 10WV		
C91			CK73FB1E473K	CHIP C	0.047UF K		
C92 ,93			CK73GB1H471K	CHIP C	470PF K		
C95 -97			CK73GB1H471K	CHIP C	470PF K		
C98			C92-0004-05	CHIP-TAN	1.0UF 10WV		
C99 -102			CK73GB1H471K	CHIP C	470PF K		
C103			C90-2050-05	ELECTR®	33UF 6.3WV		
C105,106			CK73GB1H471K	CHIP C	470PF K		
C108			CK73GB1E103K	CHIP C	0.010UF K		

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C109,110			CK73GB1H471K	CHIP C 470PF K		
C111			CK73GB1E103K	CHIP C 0.010UF K		
C112,113			CC73GCH1H270J	CHIP C 27PF J		
C115-117			CK73GB1E103K	CHIP C 0.010UF K		
C120			CK73GB1H471K	CHIP C 470PF K		
C121			CK73FB1E104K	CHIP C 0.10UF K		
C122			C92-0004-05	CHIP-TAN 1.0UF 10WV		
C123			CK73FB1E104K	CHIP C 0.10UF K		
C124			CE04NW0J221M	ELECTRO 220UF 6.3WV		
C125,126			CK73GB1H471K	CHIP C 470PF K		
C127			C90-2049-05	ELECTRO 15UF 6.3WV		
C129-131			CK73GB1H471K	CHIP C 470PF K		
C132,133			CC73GSL1H221J	CHIP C 220PF J		
CN1 ,2		*	E40-5408-05	PIN CONNECTOR(21P)		
CN3			E40-5343-05	PIN CONNECTOR(9P)		
J1			E11-0420-15	PHONE JACK(3.5D)		
J2			E11-0439-05	PHONE JACK		
		*	F20-1048-04	INSULATING BOARD		
		*	J82-0009-15	FPC		
L3			L33-0737-05	CHOKE COIL(1nH)		
L4		*	L92-0131-05	BEAS CORE		
X1		*	L77-1398-05	CRYSTAL RESONATOR(3.58MHz)		
X2			L78-0052-05	RESONATOR(800KHz)		
CP1		*	R90-0718-05	MULTI-COMP(4.7Kx4)		
CP2		*	R90-0720-05	MULTI-COMP (100Kx4)		
CP3		*	R90-0718-05	MULTI-COMP (4.7kx4)		
CP4		*	R90-0719-05	MULTI-COMP (4.7kx2)		
R1			RK73EB2B101J	CHIP R 100 J 1/8W		
R2			RK73GB1J151J	CHIP R 150 J 1/16W		
R3			RK73GB1J471J	CHIP R 470 J 1/16W		
R4			RK73GB1J104J	CHIP R 100K J 1/16W		
R5			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R8			RK73GB1J103J	CHIP R 10K J 1/16W		
R9			RK73GB1J123J	CHIP R 12K J 1/16W		
R10			RK73GB1J394J	CHIP R 390K J 1/16W		
R13			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R15			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R16			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R17			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R18			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R19 ,20			RK73GB1J274J	CHIP R 270K J 1/16W		
R21			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R22			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R23			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R25			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R26			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R27			RK73GB1J100J	CHIP R 10 J 1/16W		
R28			RK73GB1J104J	CHIP R 100K J 1/16W		
R29			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R30			RK73GB1J273J	CHIP R 27K J 1/16W		
R31			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R32			RK73GB1J223J	CHIP R 22K J 1/16W		
R33			RK73GB1J103J	CHIP R 10K J 1/16W		

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R35			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R36			RK73GB1J391J	CHIP R 390 J 1/16W		
R37			RK73GB1J154J	CHIP R 150K J 1/16W		
R38 ,39			RK73GB1J104J	CHIP R 100K J 1/16W		
R40			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R41 -43			RK73GB1J103J	CHIP R 10K J 1/16W		
R45			RK73GB1J183J	CHIP R 18K J 1/16W		
R46 ,47			RK73GB1J153J	CHIP R 15K J 1/16W		
R48			RK73GB1J104J	CHIP R 100K J 1/16W		
R49			RK73GB1J183J	CHIP R 18K J 1/16W		
R51			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R53			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R55			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R56			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R57			RK73GB1J154J	CHIP R 150K J 1/16W		
R58			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R59			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R60			RK73GB1J331J	CHIP R 330 J 1/16W		
R61			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R62			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R63			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R65			RK73GB1J154J	CHIP R 150K J 1/16W		
R66			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R67			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R68			RK73GB1J331J	CHIP R 330 J 1/16W		
R70			R92-1252-05	CHIP R 0 OHM		
R71			RK73GB1J563J	CHIP R 56K J 1/16W		
R72			RK73GB1J333J	CHIP R 33K J 1/16W		
R73			RK73GB1J153J	CHIP R 15K J 1/16W		
R75			RK73GB1J390J	CHIP R 39 J 1/16W		
R76			RK73GB1J100J	CHIP R 10 J 1/16W		
R77 ,78			RK73GB1J104J	CHIP R 100K J 1/16W		
R79			RK73GB1J153J	CHIP R 15K J 1/16W		
R80			RK73GB1J390J	CHIP R 39 J 1/16W		
R81			RK73GB1J822J	CHIP R 8.2K J 1/16W		
R82			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R83			RK73GB1J100J	CHIP R 10 J 1/16W		
R85			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R86			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R87			RK73GB1J103J	CHIP R 10K J 1/16W		
R88			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R90			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R91			RK73GB1J474J	CHIP R 470K J 1/16W		
R92			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R93			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R94			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R95 ,96			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R101			RK73GB1J100J	CHIP R 10 J 1/16W		
R102			RK73GB1J274J	CHIP R 270K J 1/16W		
R103			RK73GB1J124J	CHIP R 120K J 1/16W		
R104			RK73GB1J223J	CHIP R 22K J 1/16W		
R105			RK73GB1J273J	CHIP R 27K J 1/16W	TEMX	
R106,107			RK73GB1J223J	CHIP R 22K J 1/16W		
R109			RK73GB1J274J	CHIP R 270K J 1/16W		
R110			RK73GB1J333J	CHIP R 33K J 1/16W		

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R111			RK73GB1J224J	CHIP R 220K J 1/16W		
R112			RK73GB1J473J	CHIP R 47K J 1/16W		
R113			RK73GB1J220J	CHIP R 22 J 1/16W		
R114			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R115			RK73GB1J103J	CHIP R 10K J 1/16W		
R116			RK73FB2A220J	CHIP R 22 J 1/10W		
R117			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R119			RK73GB1J105J	CHIP R 1.0M J 1/16W		
R120			RK73GB1J101J	CHIP R 100 J 1/16W		
R121			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R124			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R127			R92-1252-05	CHIP R 0 OHM	KTE	
R128			R92-1252-05	CHIP R 0 OHM	KTEM	
R129			R92-1252-05	CHIP R 0 OHM	KM	
R130			RK73GB1J100J	CHIP R 10 J 1/16W		
R132,133			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R134			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R135			RK73FB2A101J	CHIP R 100 J 1/10W		
R137			RD14BB2B102J	RD 1.0K J 1/8W		
VR1 ,2		*	R23-3406-05	POTENTIOMETER		
VR3 -6		*	R12-6717-05	TRIMMING POT(47K)		
S1 ,2		*	S40-1414-05	PUSH SWITCH		
S3			S40-1420-05	PUSH SWITCH		
S4		*	S40-1414-05	PUSH SWITCH		
MIC			T91-0502-05	MICROPHONE		
			S-81250HG	IC(VOLTAGE REGULATOR/ +5V)		
D1		*	DE5SC4M	DIODE		
D2 -5			MA110	DIODE		
D6		*	DAN222	DIODE		
D7		*	DA221	DIODE		
D8 -13			LN01301C(Q)	DIODE		
D14			RLZJ5.6B	DIODE		
IC1			NJM4560M	IC(OP AMP X2)		
IC2 -4			TC4066BF	IC(BILATERAL SWITCH X4)		
IC5 ,6			NJM386BM	IC(OP AMP)		
IC7			TC4S66F	IC(BILATERAL SWITCH)		
IC8			S-81250HG-RD	IC(VOLTAGE REGULATOR/ +5V)		
IC9			S-8054ALR-LN	IC		
IC10		*	75116GF-674-3BE	IC(CPU)	MXTE	
IC10		*	75116GF-675-3BE	IC(CPU)	K	
IC11		*	LC7385M	IC		
IC12		*	HD404608A71H	IC(CPU)		
Q1		*	UMA9	TRANSISTOR		
Q2		*	FMA7	TRANSISTOR		
Q3		*	UMA9	TRANSISTOR		
Q4		*	FMA7	TRANSISTOR		
Q5			2SB1182F5(Q)	TRANSISTOR		
Q6		*	UMW1	TRANSISTOR		
Q7		*	UMA9	TRANSISTOR		
Q8			2SB1182F5(Q)	TRANSISTOR		
Q9		*	UMW1	TRANSISTOR		
Q10			DTB113ZK	DIGITAL TRANSISTOR		
Q11		*	DTC144EE	DIGITAL TRANSISTOR		

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Q12		*	UMG1	TRANSISTOR			
Q13			DTC144EU	DIGITAL TRANSISTOR			
Q14 ,15			2SC4116(Y)	TRANSISTOR			
Q16			2SB1182F5(Q)	TRANSISTOR			
Q17		*	2SC4617(R)	TRANSISTOR			
Q18		*	DTA144WE	DIGITAL TRANSISTOR			
Q19		*	2SC4617(R)	TRANSISTOR			
Q20		*	UMB2	TRANSISTOR			
Q21			2SB798(DL,DK)	TRANSISTOR			
Q22		*	DTC144EE	DIGITAL TRANSISTOR			
Q23			DTC144EU	DIGITAL TRANSISTOR			
Q24			DTB113ZK	DIGITAL TRANSISTOR			
B1			W09-0394-05	LITHIUM BATTERY			
S5			W02-0900-15	ENCODER(ENC)			
			212-0702-05	PLASTIC TUBE			
TX-RX UNIT (X57-3630-XX) (-11 : K, P; -21 : M, T, X, E)							
C1			C92-0004-05	CHIP-TAN	1.0UF	10WV	
C2			CK73GB1H102K	CHIP C	1000PF	K	
C3			C92-0507-05	CHIP-TAN	4.7UF	6.3WV	
C5			C92-0045-05	ELECTRO	22UF	6.3WV	
C6			CK73GB1H102K	CHIP C	1000PF	K	
C7			CK73FB1E473K	CHIP C	0.047UF	K	
C8			C92-0001-05	CHIP-TAN	0.1UF	35WV	
C9			C92-0507-05	CHIP-TAN	4.7UF	6.3WV	
C10			CK73GB1H102K	CHIP C	1000PF	K	
C11			CK73FB1E473K	CHIP C	0.047UF	K	
C12 ,13			CK73GB1H102K	CHIP C	1000PF	K	
C14			CC73GCH1H270J	CHIP C	27PF	J	
C15 ,16			CK73GB1H102K	CHIP C	1000PF	K	
C17			CK73GB1E103K	CHIP C	0.010UF	K	
C18			CC73GCH1H100D	CHIP C	10PF	D	
C19 ,20			CK73GB1H102K	CHIP C	1000PF	K	
C21			CK73GB1E103K	CHIP C	0.010UF	K	
C22			CC73GCH1H150J	CHIP C	15PF	J	
C23			CK73GB1H102K	CHIP C	1000PF	K	
C24			CC73GCH1H080D	CHIP C	8PF	D	
C25 ,26			CK73GB1H102K	CHIP C	1000PF	K	
C27			CK73GB1E103K	CHIP C	0.010UF	K	
C28			CK73GB1H102K	CHIP C	1000PF	K	
C29			CK73GB1E103K	CHIP C	0.010UF	K	
C30			CE04CW1C4R7M	ELECTRO	4.7UF	16WV	
C31			CK73GB1H102K	CHIP C	1000PF	K	
C32			CE04NW1C220M	ELECTRO	22UF	16WV	
C33			CK73GB1H102K	CHIP C	1000PF	K	
C35			CK73GB1H102K	CHIP C	1000PF	K	
C36			CC73GCH1H220J	CHIP C	22PF	J	
C37			CC73GCH1H120J	CHIP C	12PF	J	
C38			CC73GCH1H330J	CHIP C	33PF	J	
C39			CC73GCH1H030C	CHIP C	3PF	C	
C40			CC73GCH1H220J	CHIP C	22PF	J	
C41 ,42			CK73GB1H471K	CHIP C	470PF	K	
C43			CK73GB1H102K	CHIP C	1000PF	K	
C45			CK73GB1H102K	CHIP C	1000PF	K	

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C46			CC73GCH1H080D	CHIP C	8PF	D		
C47			CK73GB1E103K	CHIP C	0.010UF	K		
C50, 51			CK73GB1H102K	CHIP C	1000PF	K		
C52			CK73GB1E103K	CHIP C	0.010UF	K		
C53			CC73GCH1H060D	CHIP C	6PF	D		
C54			CC73GCH1H120J	CHIP C	12PF	J		
C55			CK73GB1E103K	CHIP C	0.010UF	K		
C56			CC73GCH1H470J	CHIP C	47PF	J		
C57			CC73GCH1H080D	CHIP C	8PF	D	M	
C57			CC73GCH1H120J	CHIP C	12PF	J	K	
C58			CC73GCH1H1R5C	CHIP C	1.5PF	C		
C61			CK73GB1H102K	CHIP C	1000PF	K		
C62			CC73GCH1H080D	CHIP C	8PF	D	M	
C62			CC73GCH1H120J	CHIP C	12PF	J	K	
C63			CK73GB1H102K	CHIP C	1000PF	K		
C65			CC73GCH1H060D	CHIP C	6PF	D	M	
C65			CC73GCH1H100DMU	CHIP C	10PF	D	K	
C66			CC73GCH1H150J	CHIP C	15PF	J		
C67			CK73GB1H102K	CHIP C	1000PF	K		
C68			CC73GCH1H040C	CHIP C	4PF	C		
C69			CC73GCH1H090D	CHIP C	9PF	D		
C70			CC73GCH1H040C	CHIP C	4PF	C		
C71 ,72			CK73GB1H102K	CHIP C	1000PF	K		
C73			CK73GB1H471K	CHIP C	470PF	K		
C75 -77			C92-0005-05	CHIP-TAN	2.2UF	6.3WV		
C78			CK73FB1E123K	CHIP C	0.012UF	K	M	
C78			CK73FB1E473K	CHIP C	0.047UF	K	K	
C79			CK73GB1H102K	CHIP C	1000PF	K		
C80			CK73FB1E333K	CHIP C	0.033UF	K		
C81			CK73GB1H102K	CHIP C	1000PF	K		
C82 ,83			CK73GB1H471K	CHIP C	470PF	K		
C84			CK73GB1H102K	CHIP C	1000PF	K		
C85			C92-0001-05	CHIP-TAN	0.1UF	35WV		
C86 ,87			CK73FB1E104K	CHIP C	0.10UF	K		
C88			CK73GB1E103K	CHIP C	0.010UF	K		
C89			CC73GCH1H270J	CHIP C	27PF	J		
C90			CC73GCH1H150J	CHIP C	15PF	J		
C91			CK73GB1E103K	CHIP C	0.010UF	K		
C92 ,93			CK73FB1E104K	CHIP C	0.10UF	K		
C94			CC73GCH1H270J	CHIP C	27PF	J		
C95			C92-0045-05	ELECTR®	22UF	6.3WV		
C96			CK73GB1H102K	CHIP C	1000PF	K		
C97			CC73GCH1H220J	CHIP C	22PF	J		
C98			CC73GCH1H070D	CHIP C	7PF	D		
C99, 100			CK73GB1H471K	CHIP C	470PF	K		
C201		*	C92-0532-05					
C202			CK73GB1E103K	CHIP C	0.010UF	K		
C203			CK73GB1H471K	CHIP C	470PF	K		
C205			C92-0507-05	CHIP-TAN	4.7UF	6.3WV		
C206			C92-0045-05	ELECTR®	22UF	6.3WV		
C207			CK73GB1H471K	CHIP C	470PF	K		
C208			CK73FB1E473K	CHIP C	0.047UF	K		
C209			C92-0001-05	CHIP-TAN	0.1UF	35WV		
C210			C92-0005-05	CHIP-TAN	2.2UF	6.3WV		
C211			CC73GCH1H270J	CHIP C	27PF	J		

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C212			C92-0002-05	CHIP-TAN	0.22UF	35WV		
C213			CK73GB1H471K	CHIP C	470PF	K		
C214			CK73GB1E103K	CHIP C	0.010UF	K		
C215-218			CK73GB1H471K	CHIP C	470PF	K		
C219			CK73GB1E103K	CHIP C	0.010UF	K		
C220			CC73GCH1H060D	CHIP C	6PF	D		
C221-223			CK73GB1H471K	CHIP C	470PF	K		
C224			CK73GB1H471K	CHIP C	470PF	K		
C225			CK73GB1H471K	CHIP C	470PF	K		
C226			CC73GCH1H050C	CHIP C	5PF	C		
C227			CK73GB1E103K	CHIP C	0.010UF	K		
C228		*	C92-0037-05	ELECTRO	10UF	16WV		
C229			CK73GB1H471K	CHIP C	470PF	K		
C230			C92-0045-05	ELECTRO	22UF	6.3WV		
C231			CK73GB1H471K	CHIP C	470PF	K		
C232			CC73GCH1H020C	CHIP C	2.0PF	C		
C233			CC73GCH1H080D	CHIP C	8PF	D		
C235			CC73GCH1H010C	CHIP C	1PF	C		
C236			CC73GCH1H090D	CHIP C	9PF	D		
C237			CC73GCH1H1R5C	CHIP C	1.5PF	C		
C238			CC73GCH1H040C	CHIP C	4PF	C		
C239			CC73GCH1H070D	CHIP C	7PF	D		
C240			CC73GCH1H020C	CHIP C	2.0PF	C		
C241			CC73GCH1H070D	CHIP C	7PF	D		
C242			CC73GCH1H040C	CHIP C	4PF	C		
C243			CC73GCH1H070D	CHIP C	7PF	D		
C245			CC73GCH1H030C	CHIP C	3PF	C		
C246			CC73GCH1H010C	CHIP C	1PF	C		
C247,248			CC73GCH1H040C	CHIP C	4PF	C		
C249			CK73GB1H471K	CHIP C	470PF	K	K	
C250			CC73GCH1H120J	CHIP C	12PF	J		
C251			CK73GB1E103K	CHIP C	0.010UF	K		
C252			CK73GB1H471K	CHIP C	470PF	K	M	
C253			CC73GCH1H030C	CHIP C	3PF	C	K	
C253			CC73GCH1H040C	CHIP C	4PF	C	M	
C255			CC73GCH1H020C	CHIP C	2.0PF	C		
C256			CK73GB1H102K	CHIP C	1000PF	K		
C257			CC73GCH1H180J	CHIP C	18PF	J		
C258			CK73GB1E103K	CHIP C	0.010UF	K		
C259			CC73GCH1H120J	CHIP C	12PF	J		
C260			CC73GCH1H050C	CHIP C	5PF	C		
C261			CC73GCH1H101J	CHIP C	100PF	J		
C262			CK73GB1E103K	CHIP C	0.010UF	K		
C263			CK73GB1H471K	CHIP C	470PF	K		
C264			CC73GCH1H120J	CHIP C	12PF	J		
C265			CK73GB1H471K	CHIP C	470PF	K		
C266			CC73GCH1H080D	CHIP C	8PF	D		
C267			CK73GB1H471K	CHIP C	470PF	K		
C268			CC73GCH1H060D	CHIP C	6PF	D		
C269			CC73GCH1H030C	CHIP C	3PF	C		
C270,271			CK73GB1H471K	CHIP C	470PF	K		
C272			CC73GCH1H060D	CHIP C	6PF	D		
C273			CK73GB1H471K	CHIP C	470PF	K		
C274			CK73GB1H471K	CHIP C	470PF	K	K	
C275			CK73GB1H471K	CHIP C	470PF	K		

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C277			CC73GCH1H050C	CHIP C 5PF C		
C278			CC73GCH1H150J	CHIP C 15PF J		
C279			CC73GCH1H060D	CHIP C 6PF D		
C281			CC73GCH1H030C	CHIP C 3PF C	K	
C282			CC73GCH1H1R5C	CHIP C 1.5PF C	K	
C283			CC73GCH1H010C	CHIP C 1PF C	K	
C284			CK73GB1H471K	CHIP C 470PF K	K	
C285,286			CK73GB1H471K	CHIP C 470PF K		
C287		*	CC73GCH1H181J	CHIP C 180PF J		
C288			CC73GCH1H150J	CHIP C 15PF J		
C289,290			CK73GB1E103K	CHIP C 0.010UF K		
C291			CC73GCH1H390J	CHIP C 39PF J		
C292,293			CK73GB1H102K	CHIP C 1000PF K		
C294			CK73GB1H471K	CHIP C 470PF K	K	
C295			CK73GB1E103K	CHIP C 0.010UF K		
C296			CK73GB1H102K	CHIP C 1000PF K		
C297			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
C298			CK73GB1E103K	CHIP C 0.010UF K		
C299			CK73GB1H471K	CHIP C 470PF K		
C300			C92-0001-05	CHIP-TAN 0.1UF 35WV		
C301			CK73GB1H102K	CHIP C 1000PF K		
C302			CK73GB1H471K	CHIP C 470PF K		
C303			CC73GCH1H220J	CHIP C 220PF J		
C305			CC73GCH1H220J	CHIP C 220PF J		
C306			CK73GB1E103K	CHIP C 0.010UF K		
C307,308			CK73FB1E104K	CHIP C 0.10UF K		
C309			CC73GCH1H270J	CHIP C 27PF J		
C310,311			CK73FB1E104K	CHIP C 0.10UF K		
C312			CK73GB1H471K	CHIP C 470PF K	K	
C313			CC73GCH1H080D	CHIP C 8PF D		
C314,315			CK73GB1H102K	CHIP C 1000PF K		
C316,317			CK73GB1H471K	CHIP C 470PF K		
C318			CK73GB1H102K	CHIP C 1000PF K		
TC201		*	C05-0373-05	TRIMMING CAP		
		*	E29-0498-04	GRAND TERMINAL(UHF)		
A200	2B	*	E29-0487-04	CONNECTOR,TERMINAL		
A201	3B	*	E29-0486-04	CONNECTOR,TERMINAL		
A202	3B	*	E29-0493-04	CONNECTOR,TERMINAL		
CN1		*	E40-5425-05	PIN CONNECTOR		
CN2			E40-3484-05	PIN CONNECTOR		
CN201		*	E40-5425-05	PIN CONNECTOR		
CN202		*	E40-5447-05	PIN CONNECTOR		
J201			E03-0170-05	AC OUTLET		
J202			E23-0603-05	TERMINAL		
TP1 ,2			E23-0342-05	TERMINAL		
		*	F20-1067-04	GRAND TERMINAL(MOUDAUL)		
A2		*	F10-1453-04	SHIELDING PLATE		
			J30-0545-05	SPACER		
W1		*	J82-0007-05	FPC		
W201		*	J82-0008-05	FPC		
CD1			L79-1013-05	FILTER		
CD201			L79-1013-05	FILTER		
CF1			L72-0362-05	CERAMIC FILTER		

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CF201			L72-0362-05	CERAMIC FILTER		
L1			L40-1091-17	SMALL FIXED INDUCTOR(1u)		
L2		*	L92-0131-05	BEAS CORE		
L3			L40-1081-80	SMALL FIXED INDUCTOR(100n)		
L5			L40-1281-80	SMALL FIXED INDUCTOR(120n)		
L6		*	L92-0132-05	BEAS CORE		
L7			L40-1092-81	SMALL FIXED INDUCTOR(1u)		
L8		*	L34-1328-05	COIL(9T)		
L9			L40-1092-19	SMALL FIXED INDUCTOR(1u)		
L10		*	L34-1334-05	COIL(5T)		
L11		*	L34-1327-05	COIL(7.5T)		
L12			L33-0680-05	CHOKE COIL		
L13		*	L92-0131-05	BEAS CORE		
L15		*	L40-8285-48	SMALL FIXED INDUCTOR(0.82u)		
L17		*	L34-4246-05	COIL(3'rd)		
L18		*	L34-4245-05	COIL(2'nd)		
L19		*	L34-4244-05	COIL(1'st)		
L20			L40-1072-80	SMALL FIXED INDUCTOR(10n)		
L21 -23		*	L92-0131-05	BEAS CARE		
L25		*	L92-0131-05	BEAS CORE		
L26			L40-1092-19	SMALL FIXED INDUCTOR(1u)		
L27			L40-1091-17	SMALL FIXED INDUCTOR(1u)		
L28		*	L92-0131-05	BEAS CORE		
L29			L40-1092-81	SMALL FIXED INDUCTOR(1u)		
L201		*	L92-0131-05	BEAS CORE		
L202			L40-2272-80	SMALL FIXED INDUCTOR(22n)		
L203			L40-1872-80	SMALL FIXED INDUCTOR(18n)		
L204		*	L92-0131-05	BEAS CORE		
L205			L40-1872-80	SMALL FIXED INDUCTOR(18n)		
L206			L40-1092-81	SMALL FIXED INDUCTOR(1u)		
L207			L34-1263-05	COIL(3.5T)		
L208,209			L34-1264-05	COIL(2.5T)		
L210			L34-1263-05	COIL(3.5T)		
L211,212			L34-1264-05	COIL(2.5T)		
L213		*	L34-1326-05	COIL(5.5T)		
L214		*	L92-0131-05	BEAS CORE		
L215,216			L34-1264-05	COIL(2.5T)		
L217,218		*	L92-0131-05	BEAS CORE		
L219		*	L40-4785-48	SMALL FIXED INDUCTOR(0.47u)		
L220		*	L40-6885-48	SMALL FIXED INDUCTOR(0.68u)		
L221			L40-2272-48	SMALL FIXED INDUCTOR(22n)		
L222,223			L40-1872-80	SMALL FIXED INDUCTOR(18n)		
L224			L40-2272-80	SMALL FIXED INDUCTOR(22n)		
L225			L40-1072-80	SMALL FIXED INDUCTOR(10n)		
L226		*	L79-1011-05	FILTER	M	
L226		*	L79-1012-05	FILTER	K	
L227,228			L40-1872-80	SMALL FIXED INDUCTOR(18n)		
L229			L40-1092-81	SMALL FIXED INDUCTOR(1u)		
L230			L40-1872-80	SMALL FIXED INDUCTOR(18n)		
L231			L40-2272-80	SMALL FIXED INDUCTOR(22n)		
L232			L34-1325-05	COIL (3.0TS)	k	
L233		*	L92-0131-05	BEAS CORE		
L235		*	L40-3982-81	SMALL FIXED INDUCTOR(0.39u)		
X1		*	L77-1438-05	CRYSTAL RESONATOR(45.505KHz)		
X201		*	L77-1440-05	CRYSTAL RESONATOR(12.8MHz)		

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X202		*	L77-1439-05	CRYSTAL RESONATOR(58.07MHz)		
XF1		*	L71-0409-05	CRYSTAL FILTER		
XF201		*	L71-0410-05	CRYSTAL FILTER		
			RK73FB2A473J	CHIP R 47K J 1/10W		
CP1		*	R90-0718-05	MULTI-COMP		
CP201		*	R90-0718-05	MULTI-COMP		
R1 ,2			RK73GB1J563J	CHIP R 56K J 1/16W		
R3			R92-1252-05	CHIP R 0 OHM		
R5			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R7			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R8			RK73GB1J103J	CHIP R 10K J 1/16W		
R9			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R10 ,11			RK73GB1J272J	CHIP R 2.7K J 1/16W		
R12			RK73GB1J270J	CHIP R 27 J 1/16W		
R13			RK73GB1J821J	CHIP R 820 J 1/16W		
R15			RK73GB1J823J	CHIP R 82K J 1/16W		
R16			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R17			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R18			RK73GB1J390J	CHIP R 39 J 1/16W		
R19			RK73GB1J181J	CHIP R 180 J 1/16W		
R20			RK73GB1J471J	CHIP R 470 J 1/16W		
R21			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R22			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R23			RK73GB1J680J	CHIP R 68 J 1/16W		
R25			RK73GB1J220J	CHIP R 22 J 1/16W		
R26			RK73GB1J271J	CHIP R 270 J 1/16W		
R27 ,28			RK73GB1J101J	CHIP R 100 J 1/16W		
R29			RK73GB1J271J	CHIP R 270 J 1/16W		
R30 ,31			RK73FB2A101J	CHIP R 100 J 1/10W		
R33			RK73GB1J470J	CHIP R 47 J 1/16W		
R35			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R36			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R37			RK73GB1J103J	CHIP R 10K J 1/16W		
R38			RK73GB1J334J	CHIP R 330K J 1/16W		
R39			RK73GB1J561J	CHIP R 560 J 1/16W		
R40			RK73GB1J471J	CHIP R 470 J 1/16W		
R41			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R42			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R43			RK73GB1J103J	CHIP R 10K J 1/16W		
R44			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R45			RK73GB1J470J	CHIP R 47 J 1/16W		
R46			RK73GB1J104J	CHIP R 100K J 1/16W		
R47			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R48			RK73GB1J121J	CHIP R 120 J 1/16W		
R49			R92-1252-05	CHIP R 0 OHM		
R50			RK73GB1J104J	CHIP R 100K J 1/16W		
R51			RK73GB1J101J	CHIP R 100 J 1/16W		
R52			RK73GB1J104J	CHIP R 100K J 1/16W		
R53			RK73GB1J180J	CHIP R 18 J 1/16W		
R54			R92-1252-05	CHIP R 0 OHM		
R55			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R56			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R57			RK73GB1J471J	CHIP R 470 J 1/16W		
R58			RK73GB1J472J	CHIP R 4.7K J 1/16W		

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R59			RK73GB1J393J	CHIP R 39K J 1/16W		
R61			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R62			RK73GB1J101J	CHIP R 100 J 1/16W		
R63			RK73GB1J103J	CHIP R 10K J 1/16W		
R64			RK73GB1J123J	CHIP R 12K J 1/16W		
R65			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R66			RK73GB1J561J	CHIP R 560 J 1/16W		
R67			RK73GB1J104J	CHIP R 100K J 1/16W	M	
R67			RK73GB1J154J	CHIP R 150K J 1/16W	K	
R68			RK73GB1J274J	CHIP R 270K J 1/16W		
R69			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R70			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R71			RK73GB1J681J	CHIP R 681 J 1/16W	K	
R72			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R73			RK73GB1J182J	CHIP R 1.8K J 1/16W	K	
R74			RK73GB1J152J	CHIP R 1.5K J 1/16W	K	
R75			RK73GB1J103J	CHIP R 10K J 1/16W		
R76			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R78 ,79			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R80 -82			R92-1252-05	CHIP R 0 0HM	K	
R201			RK73GB1J123J	CHIP R 12K J 1/16W		
R202			RK73GB1J563J	CHIP R 56K J 1/16W		
R203			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R206			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R207			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R208			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R209,210			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R211			R92-1252-05	CHIP R 0 0HM	K	
R212			RK73GB1J821J	CHIP R 820 J 1/16W		
R213			RK73GB1J153J	CHIP R 15K J 1/16W		
R215			RK73GB1J103J	CHIP R 10K J 1/16W		
R216			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R217			RK73GB1J221J	CHIP R 220 J 1/16W		
R218			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R219			RK73GB1J101J	CHIP R 100 J 1/16W		
R220			RK73GB1J220J	CHIP R 22 J 1/16W		
R222			RK73GB1J391J	CHIP R 390 J 1/16W		
R223			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R224,225			RK73GB1J221J	CHIP R 220 J 1/16W		
R226			RK73GB1J103J	CHIP R 10K J 1/16W		
R227			RK73GB1J220J	CHIP R 22 J 1/16W		
R228			RK73GB1J391J	CHIP R 390 J 1/16W		
R229			RK73GB1J180J	CHIP R 18 J 1/16W		
R230,231			RK73GB1J101J	CHIP R 100 J 1/16W		
R232,233			RK73FB2A101J	CHIP R 100 J 1/10W		
R235			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R236			RK73GB1J330J	CHIP R 33 J 1/16W		
R237			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R238			RK73GB1J150J	CHIP R 15 J 1/16W		
R239			RK73GB1J681J	CHIP R 681 J 1/16W		
R240			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R241,242			RK73GB1J472J	CHIP R 4.7K J 1/16W	K	
R243			RK73GB1J151J	CHIP R 150 J 1/16W		
R245			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R246			RK73GB1J334J	CHIP R 330K J 1/16W		

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R247			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R248			RK73GB1J180J	CHIP R 18 J 1/16W		
R249			RK73GB1J471J	CHIP R 470 J 1/16W		
R250			RK73GB1J333J	CHIP R 33K J 1/16W		
R251			RK73GB1J123J	CHIP R 12K J 1/16W		
R252			RK73GB1J220J	CHIP R 22 J 1/16W		
R253			RK73GB1J101J	CHIP R 100 J 1/16W		
R254			RD14BB2B472J	RD 4.7K J 1/8W		
R255			RK73GB1J180J	CHIP R 18 J 1/16W		
R256			RK73GB1J271J	CHIP R 270 J 1/16W		
R257			RK73GB1J223J	CHIP R 22K J 1/16W		
R258			RK73GB1J123J	CHIP R 12K J 1/16W		
R260			R92-1252-05	CHIP R 0 OHM	K	
R261			RK73GB1J103J	CHIP R 10K J 1/16W		
R262			RK73GB1J153J	CHIP R 15K J 1/16W		
R263			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R265			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R266			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R268			RK73GB1J224J	CHIP R 220K J 1/16W		
R270			RK73GB1J471J	CHIP R 470 J 1/16W		
R271			RK73GB1J152J	CHIP R 1.5K J 1/16W		
R272			RK73GB1J104J	CHIP R 100K J 1/16W		
R273			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R275			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R276			RK73GB1J681J	CHIP R 681 J 1/16W		
R277			RK73GB1J122J	CHIP R 1.2K J 1/16W		
R278			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R279			RK73GB1J182J	CHIP R 1.8K J 1/16W		
R281			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R282,283			R92-1252-05	CHIP R 0 OHM		
VR1		*	R12-6717-05	TRIMMING POT.		
D1			MA110	DIODE		
D2			MA77	DIODE		
D3			1SV172	DIODE		
D4			MI808	DIODE		
D5			MA77	DIODE		
D6		*	RD22P	DIODE		
D8			1SS312	DIODE		
D9			MA728	DIODE	K	
D10 -12			MA360	DIODE		
D13			MA77	DIODE		
D15			MA110	DIODE		
D16			HSM88AS	DIODE		
D201			MA110	DIODE		
D202			MA77	DIODE		
D203			DA204U	DIODE		
D204,205			MI808	DIODE		
D206			MA77	DIODE		
D207			MA77	DIODE	K	
D209			MA110	DIODE		
D210			MA77	DIODE		
D212			1SS300	DIODE		
D213			HSM88AS	DIODE		
D214			MA77	DIODE		

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D216			MA77	DIODE		
IC1		*	M56760FP	IC		
IC2		*	MC3372D	IC		
IC3		*	S-AV22A	POWER MODULE(VHF)		
IC201		*	M56760FP	IC		
IC202		*	MC3372D	IC		
Q1			2SC4117(BL)	TRANSISTOR		
Q2 ,3			2SC4215(Y)	TRANSISTOR		
Q4			2SC3356	TRANSISTOR		
Q5		*	2SC4619	TRANSISTOR		
Q6			2SC4083(N,P)	TRANSISTOR		
Q7			2SK360(B)	FET		
Q8		*	DTA143EE	DIGITAL TRANSISTOR		
Q9		*	DTA144EE	DIGITAL TRANSISTOR		
Q10		*	DTA143EE	DIGITAL TRANSISTOR		
Q11			DTC114YE	DIGITAL TRANSISTOR		
Q12		*	UMG2	TRANSISTOR		
Q13		*	2SC4617(R)	TRANSISTOR		
Q201			2SC4117(BL)	TRANSISTOR		
Q202			2SC4226(R24)	TRANSISTOR		
Q203			2SC4226(R23,24)	TRANSISTOR		
Q204			2SC4093(R26,27)	TRANSISTOR		
Q205-207			2SC4226(R24)	TRANSISTOR		
Q208			FMA1	TRANSISTOR	K	
Q209			DTA143EU	DIGITAL TRANSISTOR	K	
Q210			2SC4215(Y)	TRANSISTOR		
Q211,212			2SC4116(Y)	TRANSISTOR		
		*	X58-3740-00	VCO UNIT(VHF)		
		*	X58-3760-00	VCO UNIT(UHF)		
		*	X58-3770-00(A)	APC UNIT		
		*	X58-3770-00(B)	PA UNIT		
		*	X58-3770-00(C)	SUB-U UNIT		
		*	X58-3770-00(D)	NA UNIT		
		*	X59-3810-00(A)	800 UNIT	K	
		*	X59-3810-00(B)	AM UNIT	K	
			212-0702-05	PLASTIC TUBE		
VCO (VHF) UNIT (X58-3740-00)						
C1			CC73GUJ1H010C	CERAMIC CAPACITOR(1PF)C		
C2			CK73GB1H102K	CHIP C 1000PF K		
C3			CC73GCH1H050C	CHIP C 5PF C		
C4			CC73GCH1H030C	CHIP C 3PF C		
C5			CC73GCH1H010C	CHIP C 1PF C		
C7			CK73GB1H102K	CHIP C 1000PF K		
C8 ,9			CC73GCH1H100D	CHIP C 10PF D		
C10 -12			CK73GB1H102K	CHIP C 1000PF K		
C13			CK73FB1E223K	CHIP C 0.022UF K		
			E23-0486-05	TERMINAL		
		*	F10-1452-04	SHIELDING PLATE		
L1			L40-1092-19	SMALL FIXED INDUCTOR(1u)		
L2		*	L34-1333-05	COIL (8.5T)		
L3		*	L34-1331-05	COIL (5.5T)		
L4			L40-1092-48	SMALL FIXED INDUCTOR(1u)		

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R1			RK73GB1J104J	CHIP R 100K J 1/16W		
R3			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R4			RK73GB1J561J	CHIP R 560 J 1/16W		
R5			RK73GB1J151J	CHIP R 150 J 1/16W		
R6			RK73GB1J470J	CHIP R 47 J 1/16W		
R7			RK73GB1J823J	CHIP R 82K J 1/16W		
R8			RK73GB1J821J	CHIP R 820 J 1/16W		
R9			RK73GB1J823J	CHIP R 82K J 1/16W		
R10			RK73GB1J821J	CHIP R 820 J 1/16W		
D1 ,2			MA333	DIODE		
D3			MA360	DIODE		
D4			MA77	DIODE		
Q1			DTC144EU	DIGITAL TRANSISTOR		
Q2			2SK238(K17)	FET		
Q3 ,4			2SC4083(N,P)	TRANSISTOR		
VCO (UHF) UNIT (X58-3760-00)						
C1			CC73GCH1H101J	CHIP C 100PF J		
C2			CC73GCH1H010C	CHIP C 1PF C		
C3			CK73GB1H471K	CHIP C 470PF K		
C4			CK73FB1E104K	CHIP C 0.10UF K		
C5			CK73GB1H471K	CHIP C 470PF K		
C7 ,8			CK73GB1H471K	CHIP C 470PF K		
C9			CK73FB1H103K	CHIP C 0.010UF K		
C10		*	CC73GUJ1H0R5C	CERAMIC CAPACITOR		
C11			CC73GCH1H060D	CHIP C 6PF D		
C12			CK73GB1H471K	CHIP C 470PF K		
C13			CC73GCH1H040C	CHIP C 4PF C		
C14			CC73GCH1H0R5C	CHIP C 0.5PF C		
C15			CC73GCH1H050C	CHIP C 5PF C		
C16			CC73GCH1H101J	CHIP C 100PF J		
C17			CC73GCH1H050C	CHIP C 5PF C		
			E23-0486-05	TERMINAL		
			F10-1451-04	SHIELDING PLATE		
L1			L40-1092-19	SMALL FIXED INDUCTOR(1u)		
L2		*	L34-1335-05	COIL(3.5T)		
L3			L40-3382-19	SMALL FIXED INDUCTOR(0.33u)		
L4		*	L34-1332-05	COIL(4.5T)		
L5		*	L92-0131-05	BEAS CORE		
L6			L40-2281-80	SMALL FIXED INDUCTOR(220n)		
L7			L40-1092-48	SMALL FIXED INDUCTOR(1u)		
R1			RK73GB1J562J	CHIP R 5.6K J 1/16W		
R2			RK73GB1J220J	CHIP R 22 J 1/16W		
R3			RK73GB1J470J	CHIP R 47 J 1/16W		
R4			RK73GB1J333J	CHIP R 33K J 1/16W		
R5			RK73GB1J123J	CHIP R 12K J 1/16W		
R6			RK73GB1J471J	CHIP R 470 J 1/16W		
R7			RK73GB1J561J	CHIP R 560 J 1/16W		
R8			RK73GB1J333J	CHIP R 33K J 1/16W		
R9			RK73GB1J123J	CHIP R 12K J 1/16W		
R10			RK73GB1J104J	CHIP R 100K J 1/16W		
D1 ,2			MA360	DIODE		
D3			MA77	DIODE		

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D4			MA360	DIODE		
Q1		*	DTC144EE	DIGITAL TRANSISTOR		
Q2			2SK508NV(K52)	FET		
Q3 ,4		*	2SC4226(R24,25)	TRANSISTOR		
APC, PA, SUB-U NOISE UNIT (X58-3770-00)						
C1			CK73GB1H471K	CHIP C 470PF K		
C2			C92-0002-05	CHIP-TAN 0.22UF 35WV		
C3			CC73GCH1H151J	CHIP C 150PF J		
C4 -12			CK73GB1H471K	CHIP C 470PF K		
C101-103			CK73GB1H471K	CHIP C 470PF K		
C104			CK73GB1E103K	CHIP C 0.010UF K		
C105			CK73GB1H471K	CHIP C 470PF K		
C106			CK73GB1E103K	CHIP C 0.010UF K		
C107			CK73GB1H471K	CHIP C 470PF K		
C108			CK73GB1E103K	CHIP C 0.010UF K		
C109			CK73GB1H471K	CHIP C 470PF K		
C110			CC73GCH1H020C	CHIP C 2.0PF C		
C201			CC73GCH1H220J	CHIP C 22PF J		
C202			CC73GCH1H150J	CHIP C 15PF J		
C203,204			CC73GCH1H101J	CHIP C 100PF J		
C205,206			CC73GCH1H0R5C	CHIP C 0.5PF C		
C207			CC73GCH1H101J	CHIP C 100PF J		
C208			CC73GCH1H180J	CHIP C 18PF J		
C209			CC73GCH1H080D	CHIP C 8PF D		
C210			CC73GCH1H120J	CHIP C 12PF J		
C211			CK73GB1H471K	CHIP C 470PF K		
C212			CC73GCH1H020C	CHIP C 2.0PF C		
C213-215			CC73GCH1H060D	CHIP C 6PF D		
C216			CK73GB1H471K	CHIP C 470PF K		
C217			CK73GB1E103K	CHIP C 0.010UF K		
C218			CK73GB1H471K	CHIP C 470PF K		
C301,302			CK73GB1H102K	CHIP C 1000PF K		
C303			CK73EB1H333K	CHIP C 0.033UF K		
C304			C90-2049-05	ELECTRO 15UF 6.3WV		
C305			CK73FB1E223K	CHIP C 0.022UF K		
C306,307			C92-0005-05	CHIP-TAN 2.2UF 6.3WV		
TC201,202			C05-0371-05	TRIM CAP 10PF		
L101			L92-0127-05	BEAS CORE		
L102			L33-0680-05	CHOKE COIL		
L103			L34-1266-05	COIL (1.5T)		
L201			L40-5682-19	SMALL FIXED INDUCTOR		
L202			L40-3372-80	SMALL FIXED INDUCTOR		
L203			L40-1072-80	SMALL FIXED INDUCTOR		
R1			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R2			RK73GB1J564J	CHIP R 560K J 1/16W		
R3			RK73GB1J222J	CHIP R 2.2K J 1/16W		
R4 ,5			R92-1218-05	CHIP R 0.1 J 1/2W		
R6			R92-1252-05	CHIP R 0 OHM		
R7			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R8 ,9			RK73GB1J223J	CHIP R 22K J 1/16W		
R10			R92-1252-05	CHIP R 0 OHM		
R11			RK73GB1J121G	CHIP R 120 G 1/16W		
R12			RK73GB1J392J	CHIP R 3.9K J 1/16W		

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R13 ,14			RK73GB1J124J	CHIP R 120K J 1/16W		
R15			R92-1252-05	CHIP R 0 OHM		
R16 ,17			RK73GB1J124J	CHIP R 120K J 1/16W		
R18			R92-1252-05	CHIP R 0 OHM		
R19		*	RK73GB1J101G	CHIP R 100 G 1/16W		
R20			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R101,102			RK73GB1J271J	CHIP R 270 J 1/16W		
R201			RK73GB1J273J	CHIP R 27K J 1/16W		
R202			RK73GB1J220J	CHIP R 22 J 1/16W		
R203			RK73GB1J123J	CHIP R 12K J 1/16W		
R204			RK73GB1J471J	CHIP R 470 J 1/16W		
R205			RK73GB1J392J	CHIP R 3.9K J 1/16W		
R206			RK73GB1J471J	CHIP R 470 J 1/16W		
R207			RK73GB1J103J	CHIP R 10K J 1/16W		
R301			RK73GB1J274J	CHIP R 270K J 1/16W		
R302			RK73GB1J561J	CHIP R 560 J 1/16W		
R303			RK73GB1J332J	CHIP R 3.3K J 1/16W		
R304			RK73GB1J123J	CHIP R 12K J 1/16W		
R305			RK73GB1J103J	CHIP R 10K J 1/16W		
R306			RK73GB1J101J	CHIP R 100 J 1/16W		
R307			RK73GB1J152J	CHIP R 1.5K J 1/16W		
VR1		*	R12-6545-05	TRIMMING POT 470		
VR2		*	R12-6543-05	TRIMMING POT 220		
VR3		*	R12-6545-05	TRIMMING POT 470		
VR4		*	R12-6543-05	TRIMMING POT 220		
D1			MA8039	DIODE		
D2 ,3		*	DAN222	DIODE		
D101			1SV172	DIODE		
D201			HSM88AS	DIODE		
D301			HSM88AS	DIODE		
IC1			LM301AD	IC(OP AMP)		
IC101			S-AU26	POWER MODULE(UHF)		
Q1			2SK879(Y)	FET		
Q2 ,3			FMC4	TRANSISTOR		
Q4			UMG2	TRANSISTOR		
Q5 -8			FMC4	TRANSISTOR		
Q201			2SC4226(R24)	TRANSISTOR		
Q202		*	2SC4083(N,P)	TRANSISTOR		
Q301			2SC4116(Y)	TRANSISTOR		
Q302		*	UMG1	TRANSISTOR		
Q303		*	DTC114YE	DIGITAL TRANSISTOR		
800, AM UNIT (X59-3810-00) : K, P						
C1			CC73GCH1H050C	CHIP C 5PF C		
C2 ,3			CC73GCH1H101J	CHIP C 100PF J		
C4			CC73GCH1H030C	CHIP C 3PF C		
C5			CC73GCH1H020C	CHIP C 2.0PF C		
C6			CC73GCH1H090D	CHIP C 9PF D		
C7			CC73GCH1H1R5C	CHIP C 1.5PF C		
C8			CC73GCH1H150J	CHIP C 15PF J		
C9			CK73GB1H102K	CHIP C 1000PF K		
C10			CC73GCH1H390J	CHIP C 39PF J		
C11			CC73GCH1H040C	CHIP C 4PF C		
C12			CC73GCH1H101J	CHIP C 100PF J		
C101			CC73GCH1H101J	CHIP C 100PF J		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

TH-77A: K, P, M, X
TH-77E: T, E1, E2

⚠ indicates safety critical components.

PARTS LIST

* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

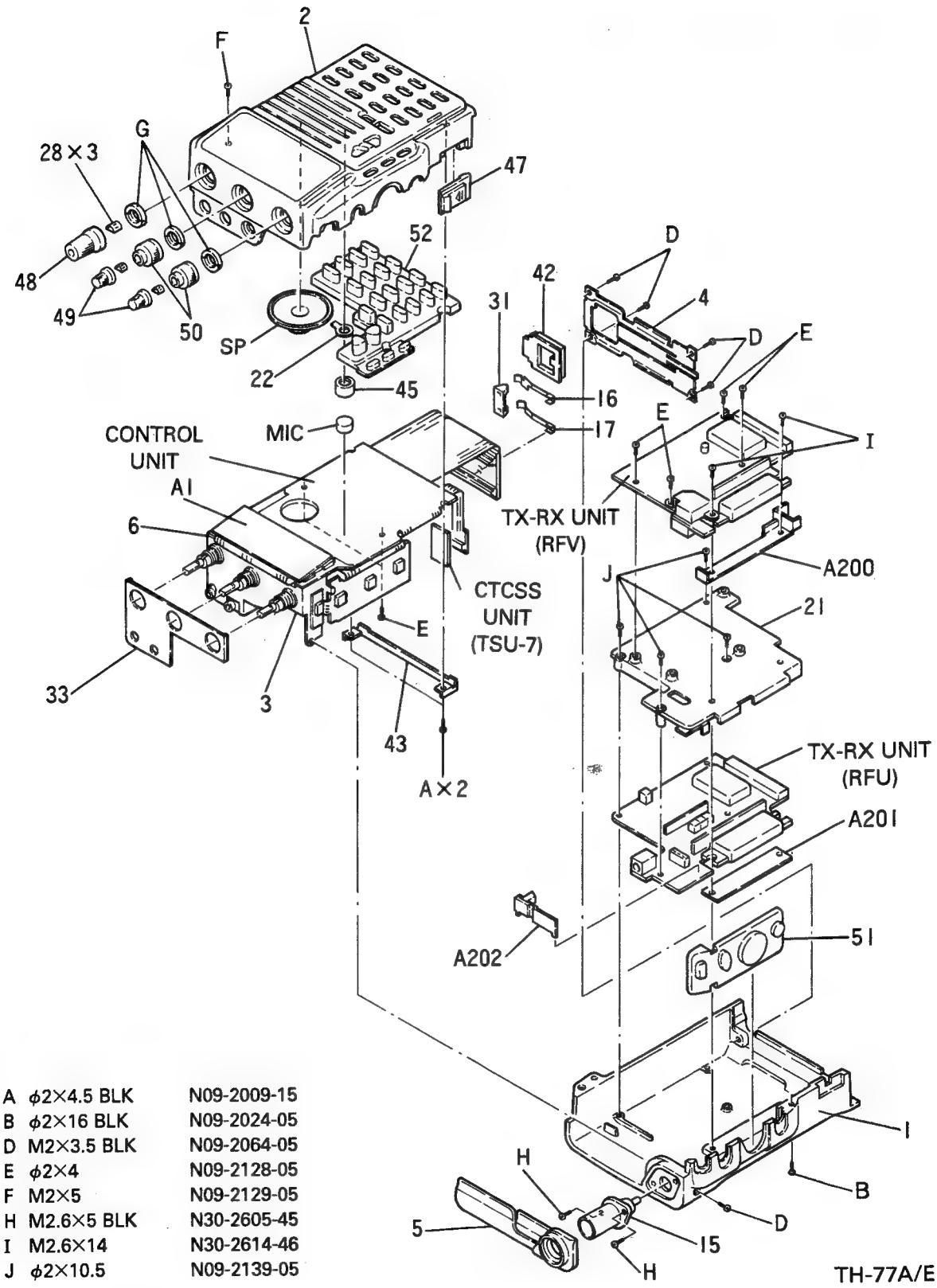
Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
C102			CK73FB1E223K	CHIP C 0.022UF K		
C103			CK73FB1E333K	CHIP C 0.033UF K		
C104			C92-0507-05	CHIP-TAN 4.7UF 6.3WV		
C105			C92-0004-05	CHIP-TAN 1.0UF 10WV		
C106			CK73GB1E103K	CHIP C 0.010UF K		
C107,108			CK73FB1E104K	CHIP C 0.10UF K		
C109			C92-0509-05	TANTAL 10UF 6.3WV		
C110			CK73GB1E103K	CHIP C 0.010UF K		
L1			L40-1681-80	SMALL FIXED INDUCTOR(180n)		
L2			L40-1072-80	SMALL FIXED INDUCTOR(10n)		
R1			R92-1252-05	CHIP R 0 OHM		
R4			RK73GB1J391J	CHIP R 390 J 1/16W		
R5			RK73GB1J393J	CHIP R 39K J 1/16W		
R6			RK73GB1J153J	CHIP R 15K J 1/16W		
R7			RK73GB1J391J	CHIP R 390 J 1/16W		
R8 ,9			RK73GB1J472J	CHIP R 4.7K J 1/16W		
R10			RK73GB1J681J	CHIP R 681 J 1/16W		
R101			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R102			R92-1252-05	CHIP R 0 OHM		
R103			RK73GB1J274J	CHIP R 270K J 1/16W		
R104			RK73GB1J102J	CHIP R 1.0K J 1/16W		
R105			RK73GB1J391J	CHIP R 390 J 1/16W		
R106			R92-1252-05	CHIP R 0 OHM		
D1			HSM88AS	CHIP DIODE		
IC101			TA7787AF	IC(FM/AM IF/3V)		
Q1		*	2SC4226(R24,25)	TRANSISTOR		
Q2		*	2SC4083(N,P)	TRANSISTOR		
Q3		*	2SC4226(R24,25)	TRANSISTOR		
Q101		*	2SC4617(R)	TRANSISTOR		
Q102			2SC4116(Y)	TRANSISTOR		
Q103			DTC144EU	DIGITAL TRANSISTOR		

E: Scandinavia & Europe K: USA P: Canada W: Europe
U: PX(Far East, Hawaii) T: England M: Other Areas
UE: AAFES(Europe) X: Australia

TH-77A: K, P, M, X
TH-77E: T, E1, E2

⚠ indicates safety critical components.

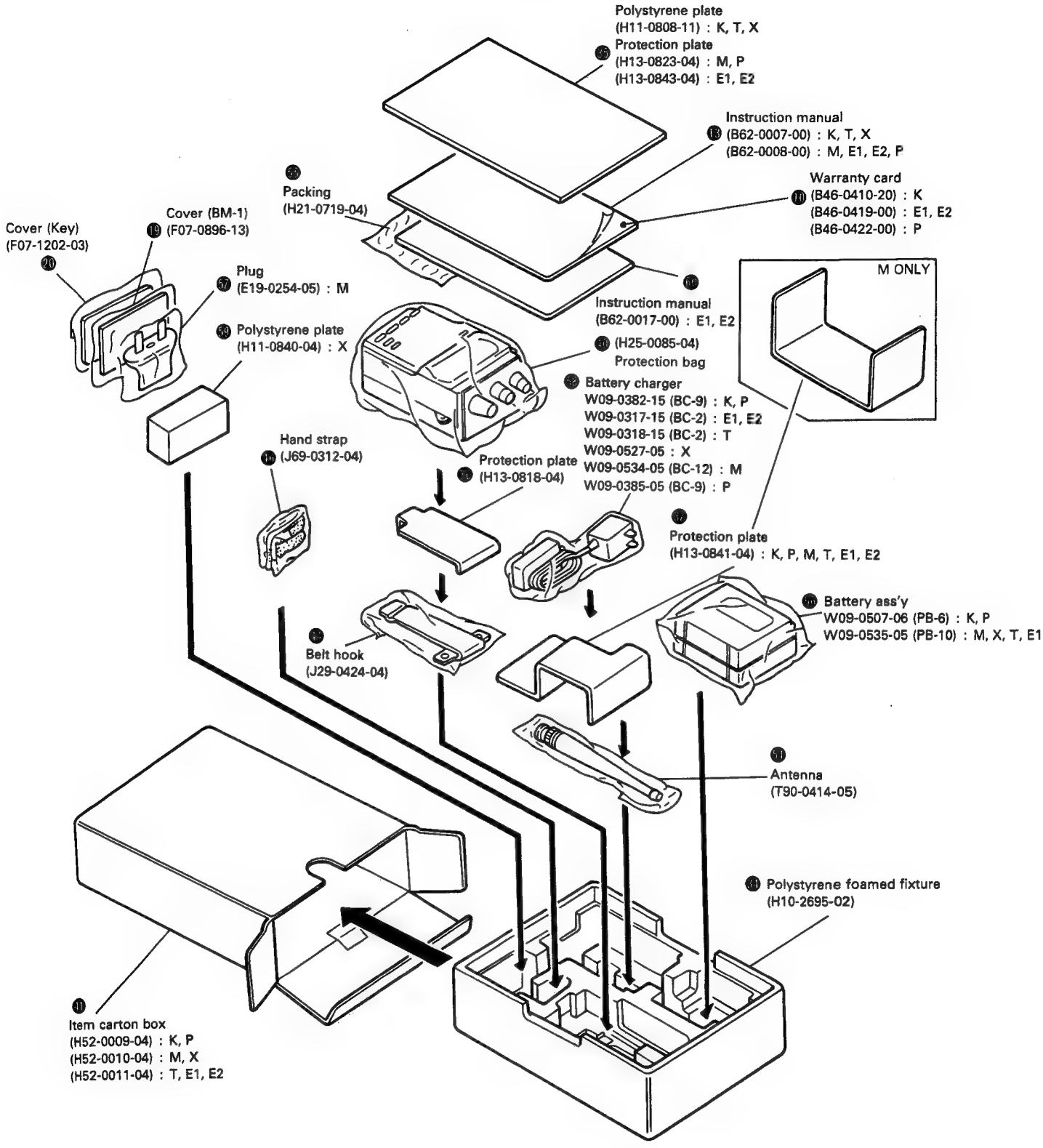
DISASSEMBLY



A	φ2×4.5 BLK	N09-2009-15
B	φ2×16 BLK	N09-2024-05
D	M2×3.5 BLK	N09-2064-05
E	φ2×4	N09-2128-05
F	M2×5	N09-2129-05
H	M2.6×5 BLK	N30-2605-45
I	M2.6×14	N30-2614-46
J	φ2×10.5	N09-2139-05

Parts with the exploded numbers larger than 700 are not supplied.

PACKING


Polystyrene plate
(H11-0808-11) : K, T, X
Protection plate
(H13-0823-04) : M, P
(H13-0843-04) : E1, E2
Instruction manual
(B62-0007-00) : K, T, X
(B62-0008-00) : M, E1, E2, P
Warranty card
(B46-0410-20) : K
(B46-0419-00) : E1, E2
(B46-0422-00) : P
Packing
(H21-0719-04)
Cover (Key)
(F07-1202-03)
Cover (BM-1)
(F07-0896-13)
Plug
(E19-0254-05) : M
Polystyrene plate
(H11-0840-04) : X
Instruction manual
(B62-0017-00) : E1, E2
(H25-0085-04)
Protection bag
Battery charger
W09-0382-15 (BC-9) : K, P
W09-0317-15 (BC-2) : E1, E2
W09-0318-15 (BC-2) : T
W09-0527-05 : X
W09-0534-05 (BC-12) : M
W09-0385-05 (BC-9) : P
M ONLY
Hand strap
(J69-0312-04)
Protection plate
(H13-0818-04)
Protection plate
(H13-0841-04) : K, P, M, T, E1, E2
Battery ass'y
W09-0507-06 (PB-6) : K, P
W09-0535-05 (PB-10) : M, X, T, E1,
Belt hook
(J29-0424-04)
Antenna
(T90-0414-05)
Polystyrene foamed fixture
(H10-2695-02)
Item carton box
(H52-0009-04) : K, P
(H52-0010-04) : M, X
(H52-0011-04) : T, E1, E2

ADJUSTMENT

Required test equipment

1. Stabilized Power Supply
1) The supply voltage can be changed between 5V and 18V, and the current is 3A or more.
2) The standard voltage is 13.8V.

2. DC Ammeter
1) Class 1 ammeter (17 ranges and other features).
2) The full scale can be set to either 300mA or 3A.
3) A cable of less internal loss must be used.

3. Frequency Counter (f. counter)
1) Frequencies of up to 1GHz or so can be measured.
2) The sensitivity can be changed to 250MHz or below, and measurements are highly stable and accurate (0.2ppm or so).

4. Power Meter
1) Measurable frequency : Up to 500MHz.
2) Impedance : 50Ω, unbalanced.
3) Measuring range : Full scale of 10W or so.
4) A standard cable (5D2W 1m) must be used.

5. RF VTVM (RF V.M)
1) Measurable frequency : Up to 500MHz or so.

6. Linear Detector
1) Measurable frequency : Up to 500MHz.
2) Characteristics are flat, and CN is 60dB or more.

7. Digital Voltmeter
1) Voltage range : FS = 18V or so.
2) Input resistance : 1MΩ or more.

8. Oscilloscope
1) Measuring range : DC to 30MHz.
2) Provides highly accurate measurements for 5 to 25MHz.

9. AF Voltmeter (AF V.M)
1) Measurable frequency : 50Hz to 1MHz.
2) Maximum sensitivity : 1mV or more.

10. Spectrum Analyzer
1) Measuring range : DC to 1GHz or more.

11. Standard Signal Generator (SSG)
1) Maximum frequency : 500MHz or more.
2) Output : –20dB/0.1μV to 120dB/1V.
3) Output impedance : 50Ω

12. Tracking Generator
1) Center frequency : 50kHz to 200MHz.
2) Frequency deviation : ±35MHz.
3) Output voltage : 100mV or more.

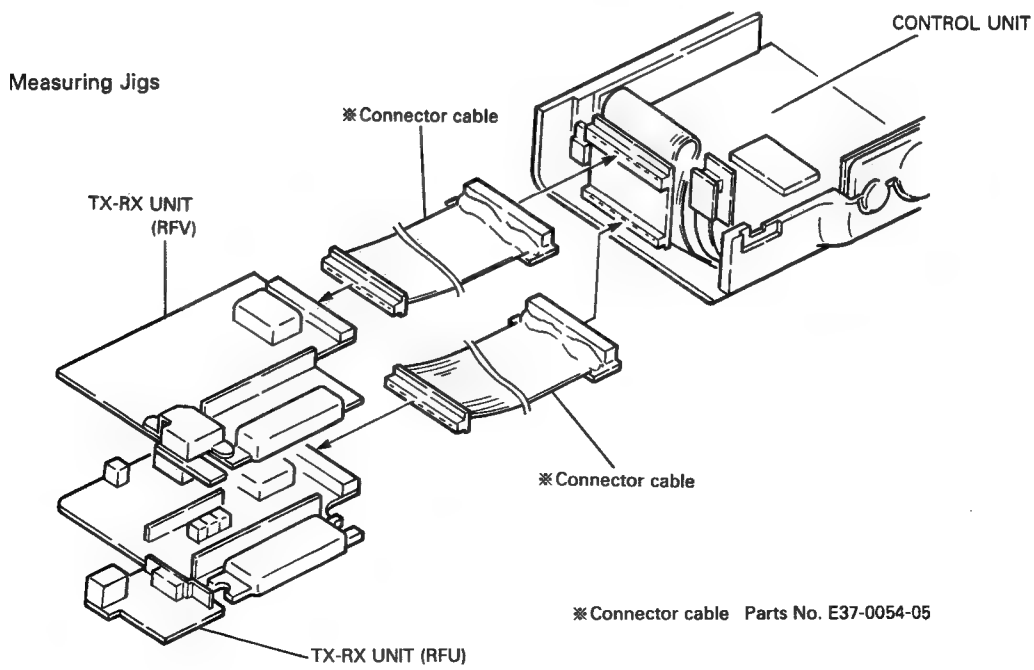
13. Dummy Load
1) 8Ω, 3W or more.

Preparation

- Set the unit in the receiving mode and set the controls as follows, unless otherwise specified.

POWER SW	ON
VHF SQL VR	MIN
UHF SQL VR	MIN
HI/LOW	HI

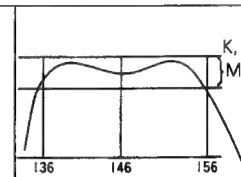
- Use a non-conductive rod such as a Bakelite rod for adjustment (especially of trimmers and coils).
- To protect the SSG, do not send out signals while adjusting the receiving unit.
- The indicted SSG output levels are for maximum output.



※Connector cable Parts No. E37-0054-05

ADJUSTMENT

TX-RX COMMON ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
1. Reset	1) While holding the M key down, set the POWER switch to ON.							Display MAIN: 433.000 M, T, X, E MAIN: 440.000 K, P SUB: 144.000 SAVE: ON APO:ON
2. Voltage confirmation	1) External power supply voltage: 9 V	DC V.M		DC IN			Check	
PLL ADJUSTMENT								
1. Transmit frequency	1) FREQ.: 439.975 MHz: M, X, T, E 449.975 MHz: K, P	f. counter Power meter		ANT	TX-RX (RFU)	TC201	439.975 MHz 449.975 MHz	±200 Hz
VHF RX ADJUSTMENT								
1. BPF	1) Tracking generator output : −40 dBm Connect the spectrum analyzer to TP2. ATT: 10 dB LOG/DIV: 2 dB	Tracking generator Spectrum analyzer	TX-RX (RFV)	ANT TP2	TX-RX (RFV)	L19 L18 L17		
2. Receive sensitivity	SSG output: −122 dBm/0.18µV 1) FREQ.: 146.05 MHz K, P, M, X FREQ.: 145.05 MHz T, E1, E2	Oscilloscope AF V.M Distortion meter SSG Dummy Load		ANT EXT SP			Check	SINAD 12 dB or hgiher.
	2) FREQ.: 144,05 MHz							
	3) FREQ.: 147.95 MHz K, P, M, X FREQ.: 145,95 MHz T, E1, E2							
3. Squelch	1) FREQ.: 145.050 MHz T, E1, E2 FREQ.: 146,050 MHz K, P, M, X SSG output: OFF V SQL VR: At the point where noise disappears.						Check	Knob position 8:30 to 11:00
	2) SSG output: −127 dBm/0.1µV							Squelch is open.
	3) SSG output: −119dBm/0.25µV V SQL VR: MAX							
4. S-meter	1) FREQ.: 145.050 MHz T, E1, E2 FREQ.: 146.050 MHz K, P, M ,X SSG output: −124dBm/0.14µV				TX-RX (RFV)	VR1	Adjust so that all the signal-strength segments go on then the last segment bliniks.	
	2) SSG output: −91dBm/6.3µV						check	All segments on.
	3) SSG output: −127dBm/0.1µV							All segments off.
UHF RX ADJUSTMENT								
1. Receive sensitivity	1) FREQ.: 430.050 MHz M, X, T, E1, E2 FREQ.: 438.050 MHz K, P SSG output: −121 dBm/0.23 µV	Oscilloscope AF V.M Distortion meter SSG Dummy Load		EXT.SP ANT			Check	SINAD 12 dB or higher.
	2) FREQ.: 430.050 MHz M, X, T, E1, E2 FREQ.: 445.050 MHz K, P							
	3) FREQ.: 439.950 MHz M, X, T, E1, E2 FREQ.: 449.950 MHz K, P							

ADJUSTMENT

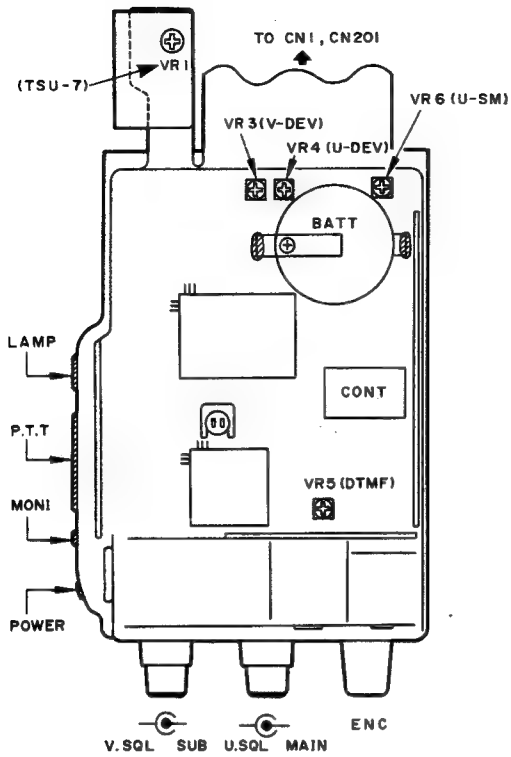
Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
2. Squelch	1) FREQ.: 435.050 MHz M, X, T, E1, E2 FREQ.: 445.050 MHz K, P SSG output: OFF U SQL VR: At the point where noise disappears	Oscilloscope AF V.M Distortion meter SSG Dummy Load		EXT.SP ANT			Check	Knob position 8:00 to 11:00
	2) SSG output: −127 dBm/0.1 µV							Squelch is open.
	3) SSG output: −118 dBm/0.28 µV U SQL VR: MAX							
3. S-meter	1) FREQ.: 435.050 MHz M, X, T, E1, E2 FREQ.: 445.050 MHz K, P SSG output: −95 dBm/4.0 µV			ANT	CONT	VR6	Adjust so that all the signal-strength segments go on then the last segment blinks.	
	2) SSG output: −83 dBm/5.8 µV						check	All segments on.
	3) SSG output: −127 dBm/0.1 µV							All segments off.
SUB-UHF RX ADJUSTMENT								
1. Receive sensitivity	1) FREQ.: 439.950 MHz M, X, T, E1, E2 FREQ.: 449.950 MHz K, P SSG output: −118 dBm/0.28 µ	Oscilloscope AF V.M Distortion meter SSG Dummy Load		ANT EXT SP	TX/RX (RFV) SUB-U	TC201 TC202	Check MAX imum sensitivity	SINAD 12 dB or higher.
	2) FREQ.: 430.050 MHz M, X, T, E1, E2 FREQ.: 438.050 MHz K, P						Check	
	3) FREQ.: 435.050 MHz M, X, T, E1, E2 FREQ.: 445.050 MHz K, P							
2. Squelch	1) FREQ.: 435.050 MHz M, X, T, E1, E2 FREQ.: 445.050 MHz K, P SSG output: OFF U SQL VR: At the point where noise disappears						Check	Knob position 8:00 to 11:00
	2) SSG output: −127 dBm/0.1 µV						Check	Squelch is open.
	3) SSG output: −115 dBm/0.4 µV U SQL VR: MAX							
3. S-meter	1) FREQ.: 435.050 MHz M, X, T, E1, E2 FREQ.: 445.050 MHz K, P SSG output: −77 dBm/31.6 µV						Check	All segments on
	2) SSG output: −120 dBm/0.22 µ							All segments off.
TX ADJUSTMENT (VHF)								
1. Power (LOW)	1) External power supply voltage: 13.8 V FREQ.: 144.975 MHz T, E1, E2 FREQ.: 146.000 MHz K, P, M, X HI/LOW SW: LOW PTT: ON	Power meter Ammeter		ANT	TX-RX (APC)	VR4	0.5 W ADJ	±0.2 W 0.8A or less
	2) FREQ.: 144.000 MHz FREQ.: 145.975 MHz: T, E1, E2 FREQ.: 147.975 MHz K, P, M, X						Check	0.2 W~0.8 W 0.8 A or less

ADJUSTMENT

Item	Condition	Measurement			Adjustment			Specifications/Remarks
		Test-equipment	Unit	Terminal	Unit	Parts	Method	
(HI)	3) HI/LOW SW: HI PTT: ON FREQ.: 144.975 MHz T, E1, E2 FREQ.: 146.000 MHz K, P, M, X	Power meter Ammeter		ANT	TX-RX (APC)	VR3	MAX	5.5 W or more.
							Set to 5.2 W.	1.7 A or less.
	4) FREQ.: 144.000 MHz FREQ.: 145.975 MHz T, E1, E2 FREQ.: 147.975 MHz K, P, M, X						Check	5.0 W~6.5 W 1.7 A or less.
(MID)	5) HI/LOW SW: MID PTT: ON FREQ.: 144.975 MHz T, E1, E2 FREQ.: 146.000 MHz K, P, M, X						Check	1.5 W~3.5 W
TX ADJUSTMENT (UHF)								
1. Power (LOW)	1) External power supply voltage: 13.8 V FREQ.: 434.975 MHz M, X, T, E1, E2 FREQ.: 444.975 MHz K, P HI/LOW SW: LOW PTT: ON	Power meter Ammeter		ANT	TX-RX (APC)	VR2	0.5 W ADJ	±0.2 W 0.8A or less.
	2) FREQ.: 430.000 MHz M, X, T, E1, E2 FREQ.: 438.000 MHz K, P						Check	0.2 W~0.8 W 0.8 A or less.
	3) FREQ.: 439.975 MHz M, X, T, E1, E2 FREQ.: 449.975 MHz K, P							
(HI)	4) FREQ.: 434.975 MHz M, X, T, 1, E2 FREQ.: 444.975 MHz K, P HI/LOW SW: HI PTT: ON					VR1	MAX	5.5 W or more.
							Set to 5.2 W.	1.7 A or less.
	5) FREQ.: 430.000 MHz M, X, T, E1, E2 FREQ.: 438.000 MHz K, P						Check	5.0 W~6.5 W 1.7 A or less.
	6) FREQ.: 439.975 MHz M, X, T, E1, E2 FREQ.: 449.975 MHz K, P							
(MID)	7) HI/LOW SW: MID PTT: ON FREQ.: 439.975 MHz M, X, T, E1, E2 FREQ.: 449.975 MHz K, P						Check	1.5 W~3.5 W
TX COMMON ADJUSTMENT								
1. DEV	1) External power supply voltage: 13.8 V FREQ.: 144.000 MHz AG: 1 kHz/50 mV PTT: ON	Power meter Linear detector f.counter AG Oscilloscope AF V.M		ANT MIC	CONT	VR3	+4.3 kHz ADJ	±100 Hz
	2) FREQ.: 439.975 MHz M, X, T, E1, E2 FREQ.: 439.975 MHz K, P PTT: ON					VR4	+4.3 kHz ADJ	±100 Hz
	3) AG: 1 kHz/5 mV						Check (MIC sensitivity)	±2.6~3.5 kHz
2. DTMF DEV	1) FREQ.: 145.975 MHz T, E1, E2 FREQ.: 147.975 MHz K, P, M, X AG: OFF PTT: ON TONE key: Push					VR5	~3.5 kHz ADJ check (Tone Wave Form)	±200 Hz (Dual tone)
3. TONE DEV	1) TONE key: Push M, X PTT:ON						Check	±0.5~1.25 kHz
	K, P				TSU-7	VR1	±0.8 kHz	
	T, E1, E2						Check	±2.5~±4.5 kHz

ADJUSTMENT

Adjustment point

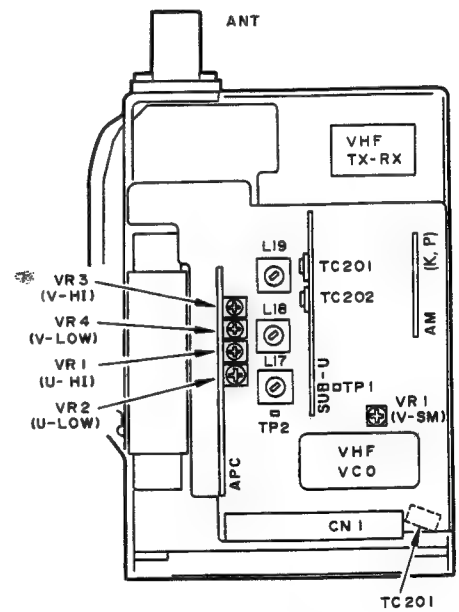


CONT UNIT: X53-333X-XX

CONT UNIT: X53-333X-XX
- VR3: VHF DEV
- VR4: UHF DEV
- VR5: DTMF DEV
- VR6: S-meter (UHF)

CTCSS UNIT: X52-3710-00 (TSU-7)
- VR1: TONE DEV

TX-RX UNIT (RFV):X57-3630-XX

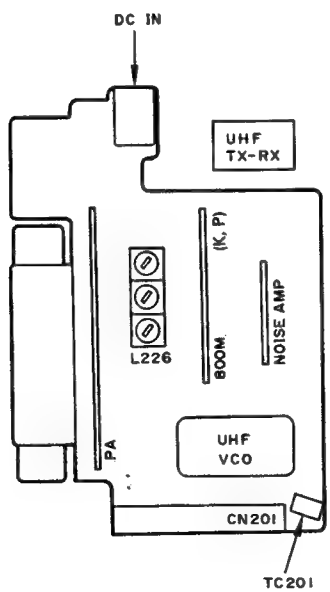


TX-RX UNIT (RFV): X57-3630-XX
- VR1: S-meter (VHF)
- L17~19: VHF BPF

SUB UNIT (APC): X58-3770-00 (A)
- VR1: UHF high power
- VR2: UHF low power
- VR3: VHF high power
- VR4: VHF low power

SUB UNIT (SUB-U): X58-3770-00 (C)
- TC201, 202: SUB-UHF RX sensitivity

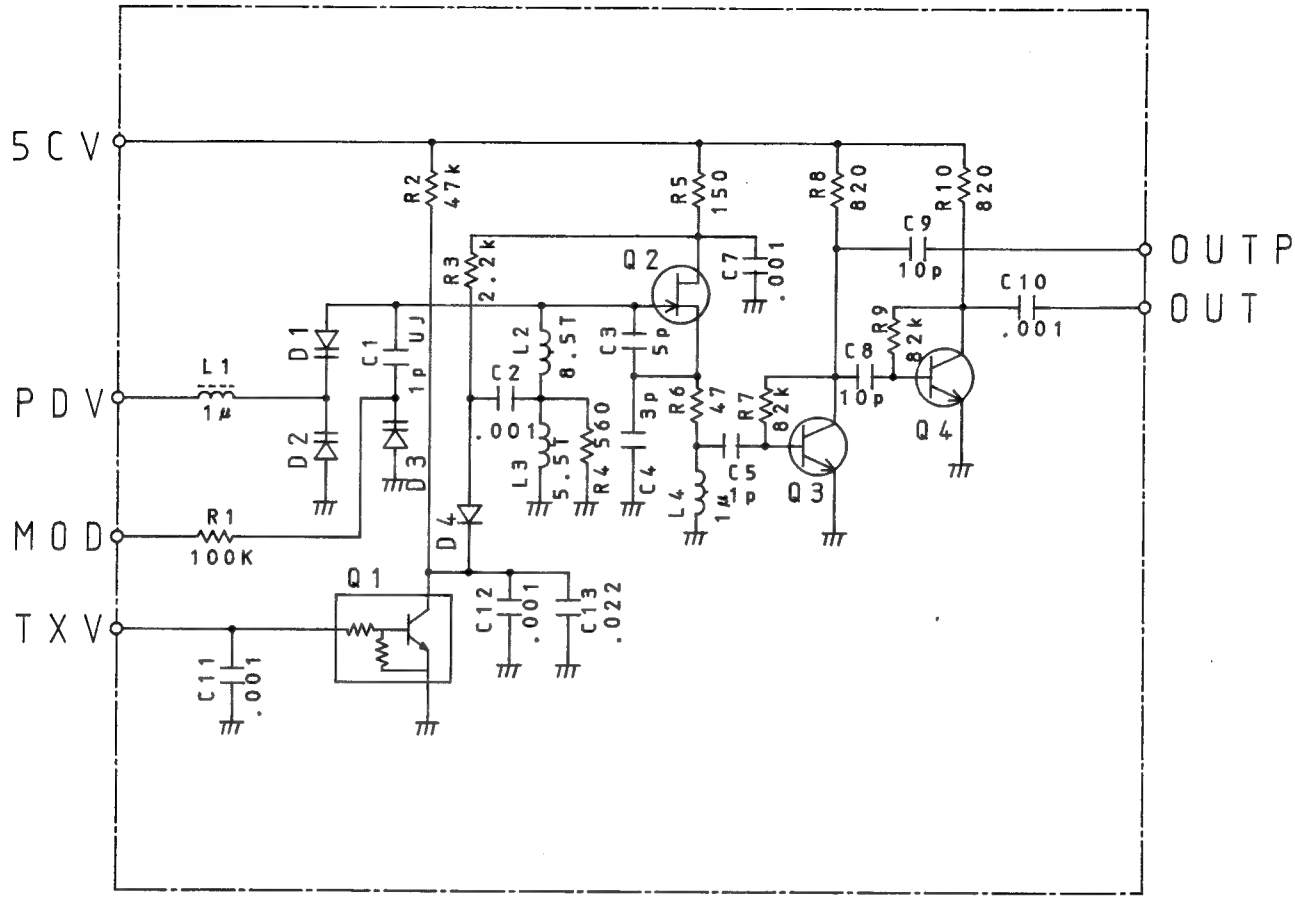
TX-RX UNIT (RFU):X57-3630-XX



TC201: TX frequency

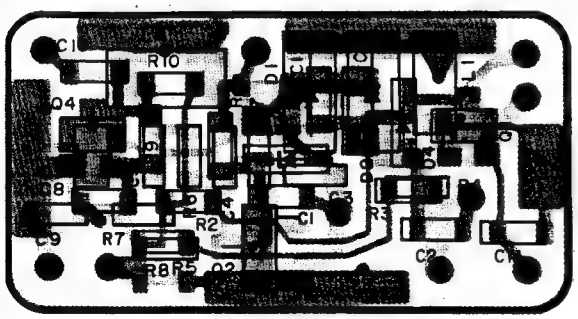
CIRCUIT DIAGRAM/PC BOARD VIEWS

▼VHF VCO(X58-3740-00)



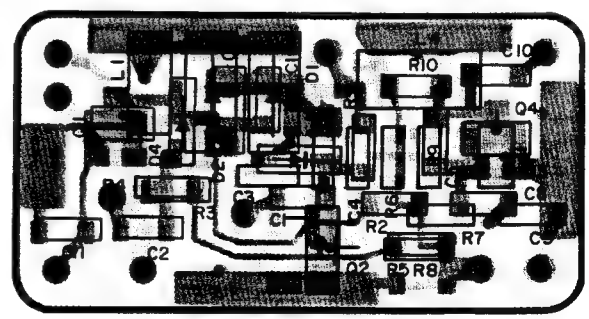
Q1	DTC144EU	D1	MA333
Q2	2SK238 (K17)	D2	MA333
Q3	2SC4083 (N, P)	D3	MA360
Q4	2SC4083 (N, P)	D4	MA77

▼VHF VCO (X58-3740-00)
Component side view



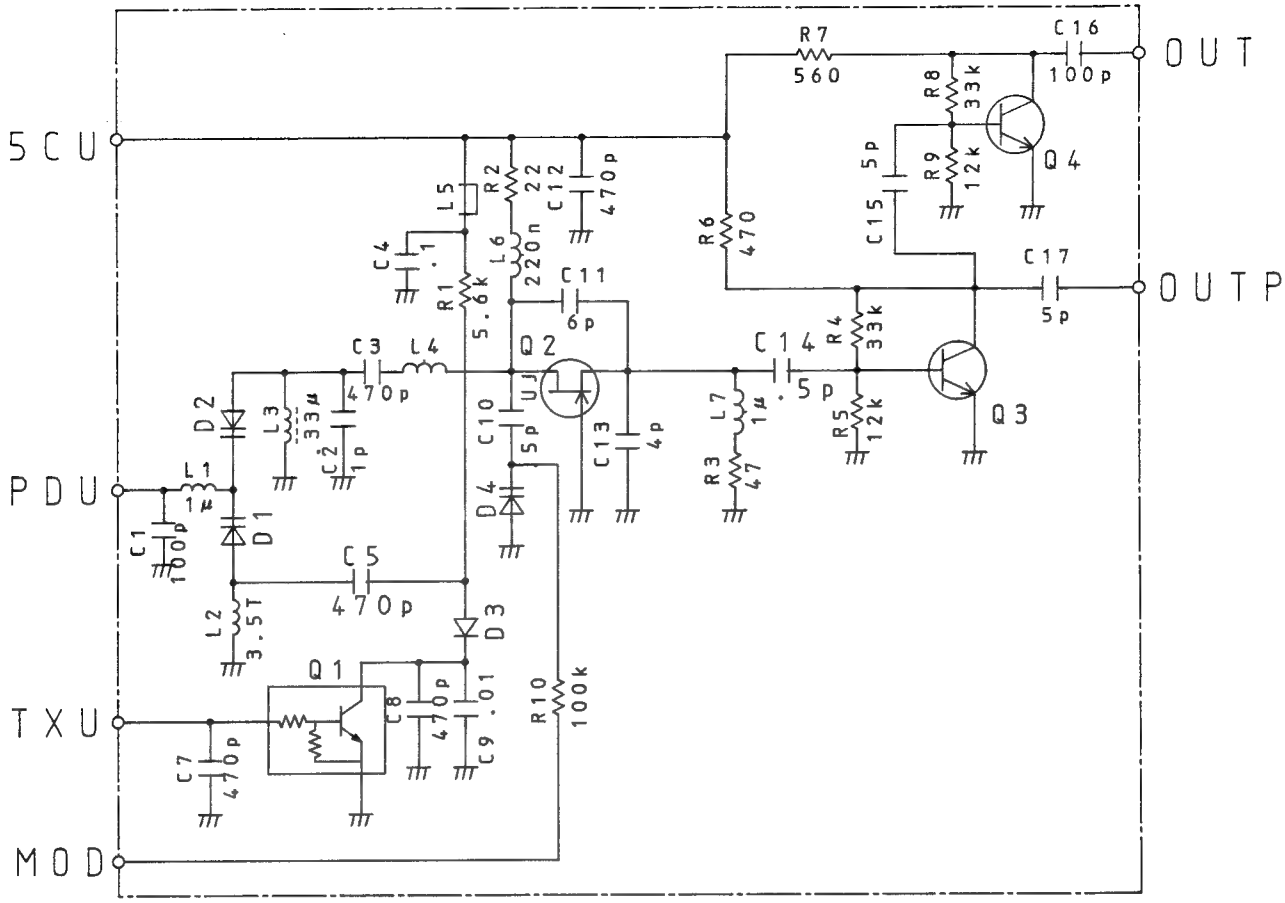
DTC144EU

▼VHF VCO (X58-3740-00)
Foil side view



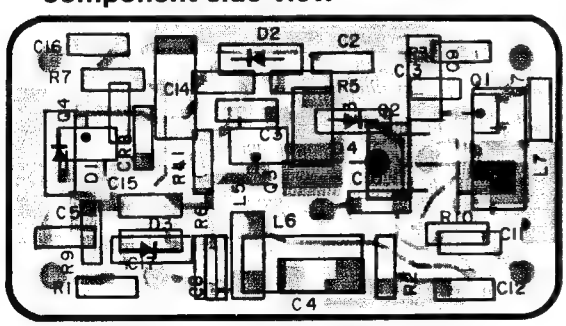
CIRCUIT DIAGRAM/PC BOARD VIEWS

▼UHF VCO (X58-3760-00)

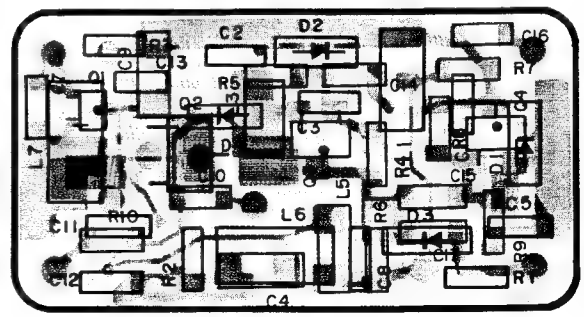


Q1	DTC144EE	D1	MA360
Q2	2SK508NV (K52)	D2	MA360
Q3	2SC4226 (R24, 25)	D3	MA77
Q4	2SC4226 (R24, 25)	D4	MA360

▼UHF VCO (X58-3760-00)
Component side view



▼UHF VCO (X58-3760-00)
Foil side view

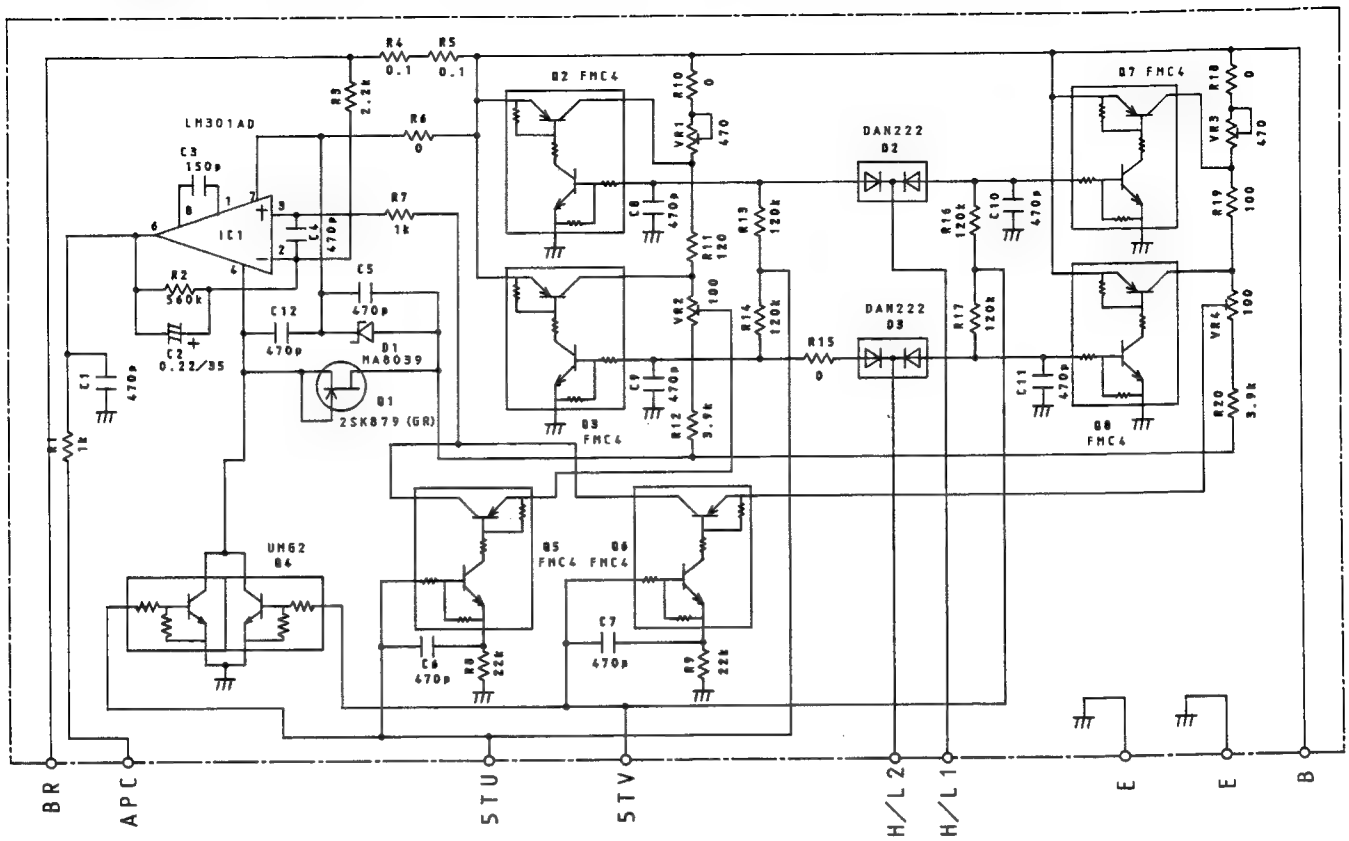


2SK508NV

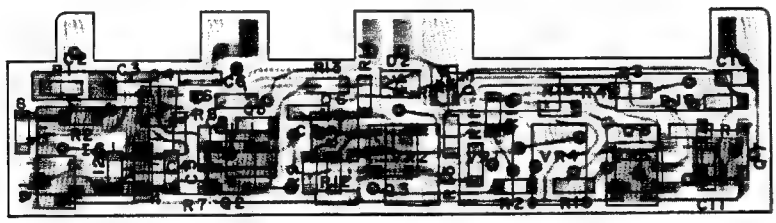
2SC4226

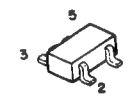
CIRCUIT DIAGRAM/PC BOARD VIEWS

▼APC (X58-3770-00)(A)

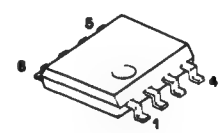


▼ APC (X58-3770-00) (A)
Component side view



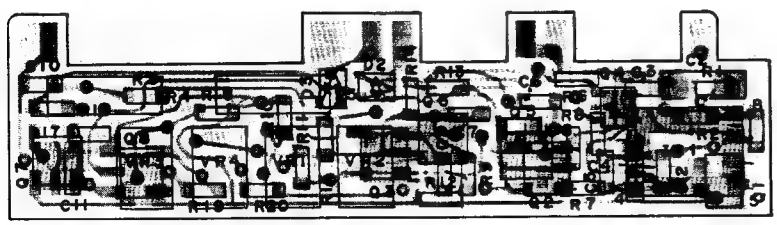


FMC4



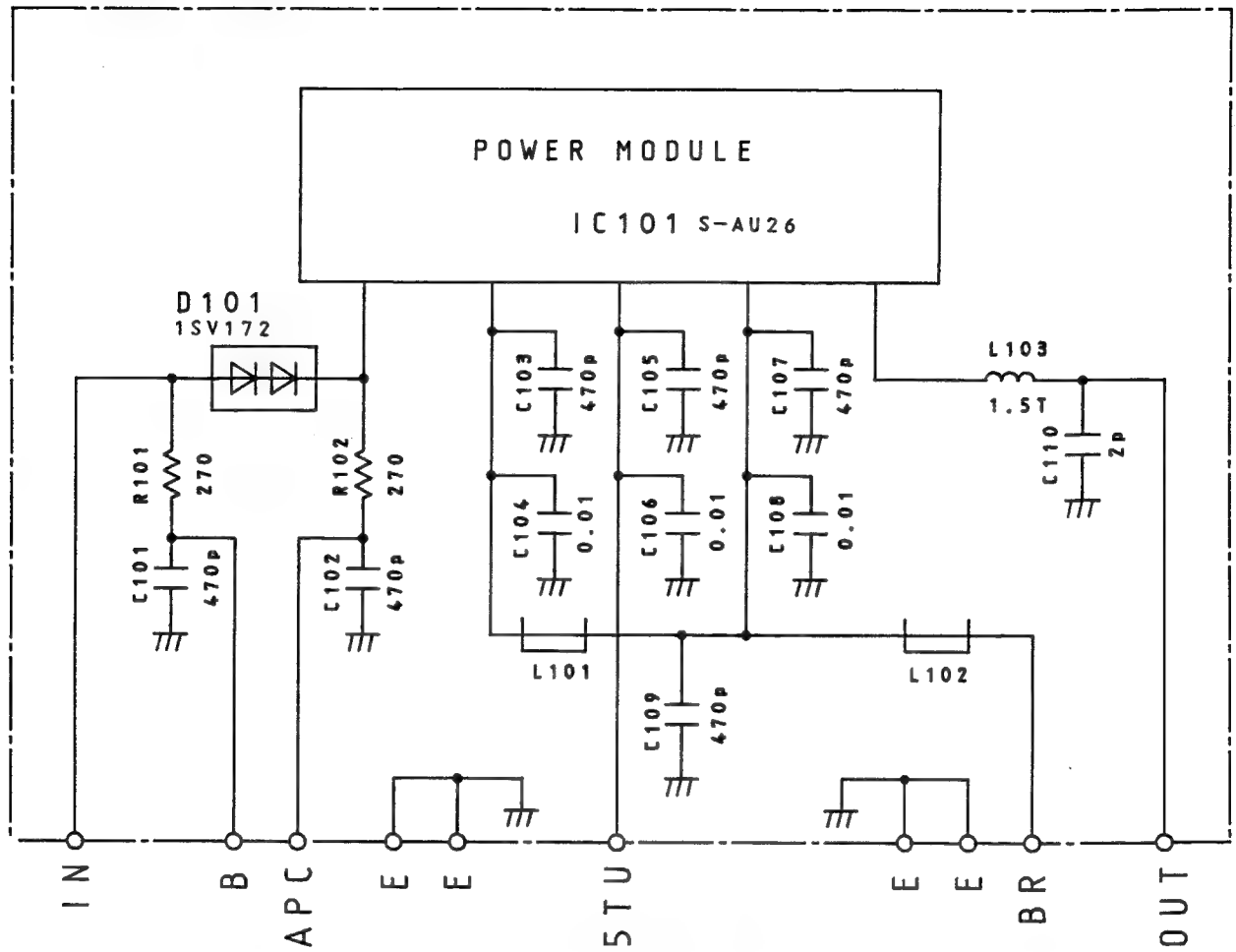
LM301AD

▼ APC (X58-3770-00) (A)
Foil side view

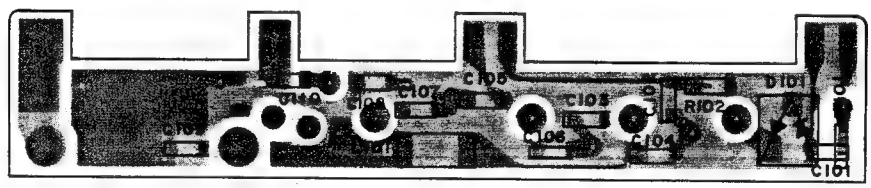


CIRCUIT DIAGRAM/PC BOARD VIEWS

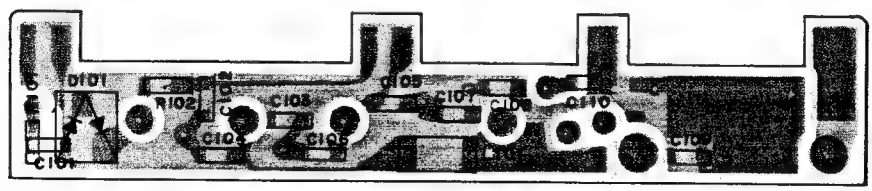
▼PA (X58-3770-00)(B)



▼PA (X58-3770-00) (B)
Component side view

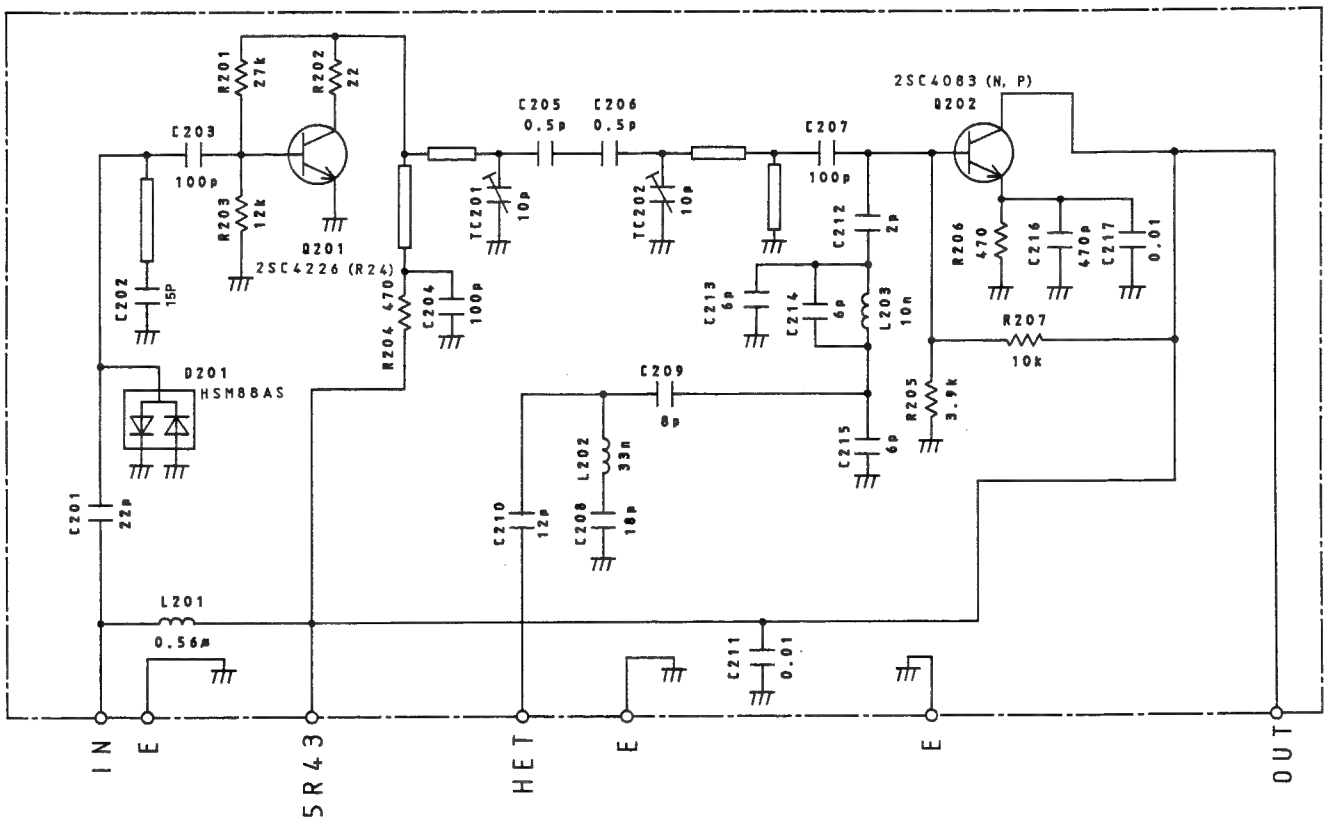


▼PA (X58-3770-00) (B)
Foil side view

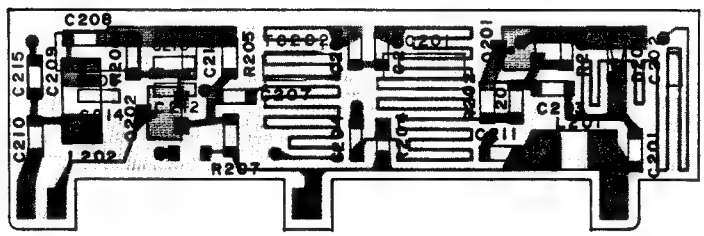


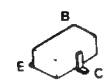
CIRCUIT DIAGRAM/PC BOARD VIEWS

▼SUB-U (X58-3770-00) (C)



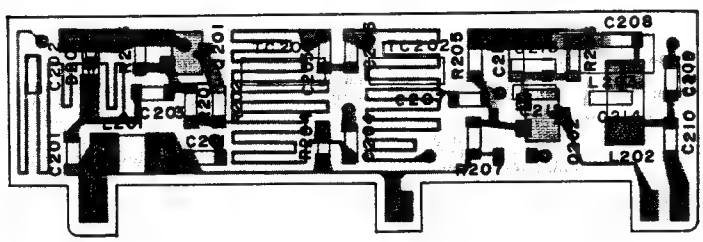
▼SUB-U (X58-3770-00) (C)
Component side view





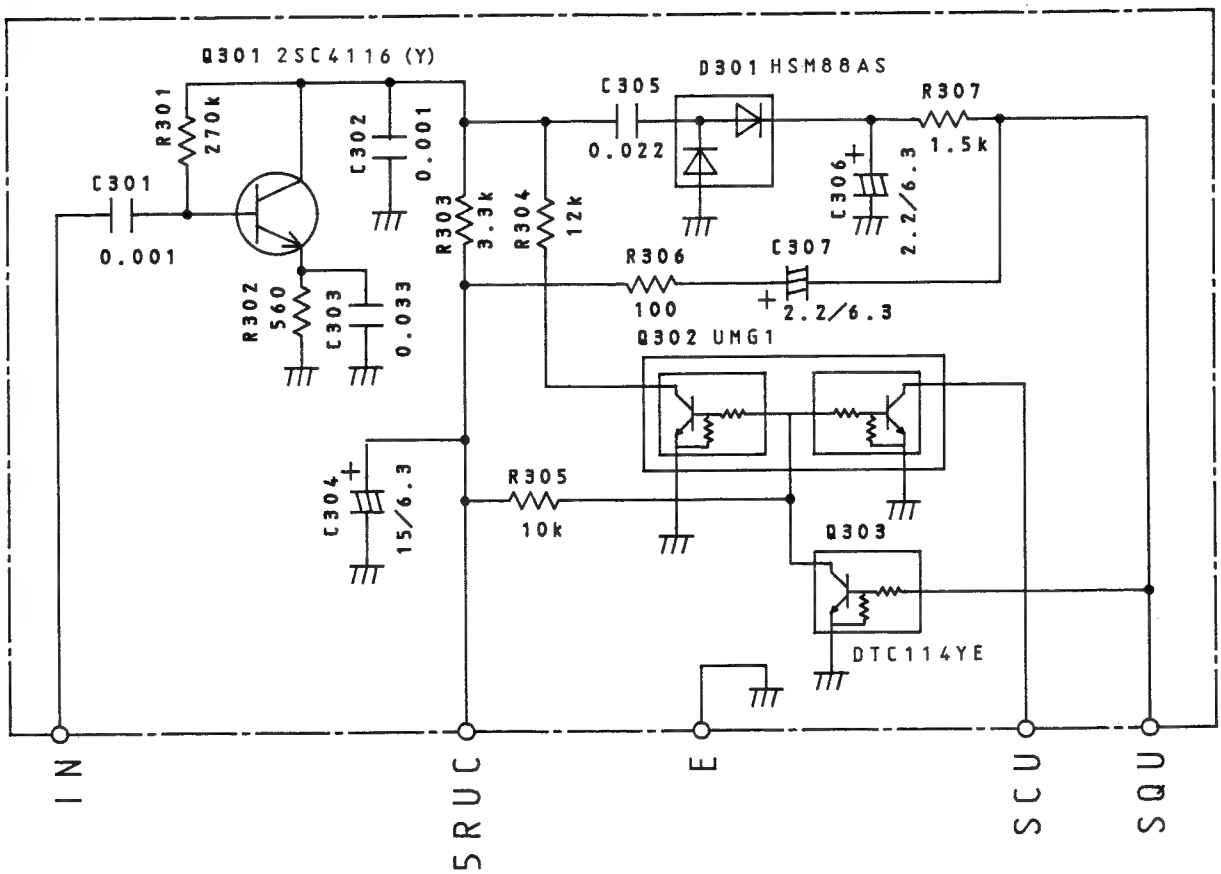
2SC4226

▼SUB-U (X58-3770-00) (C)
Foil side view

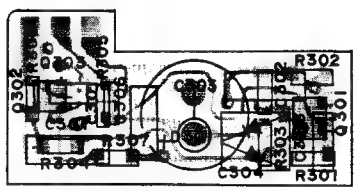


CIRCUIT DIAGRAM/PC BOARD VIEWS

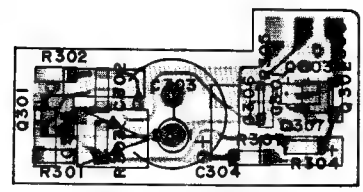
▼NOISE AMP (X58-3770-00)(D)

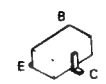


▼ NOISE AMP (X58-3770-00) (D)
Component side view



▼ NOISE AMP (X58-3770-00) (D)
Foil side view

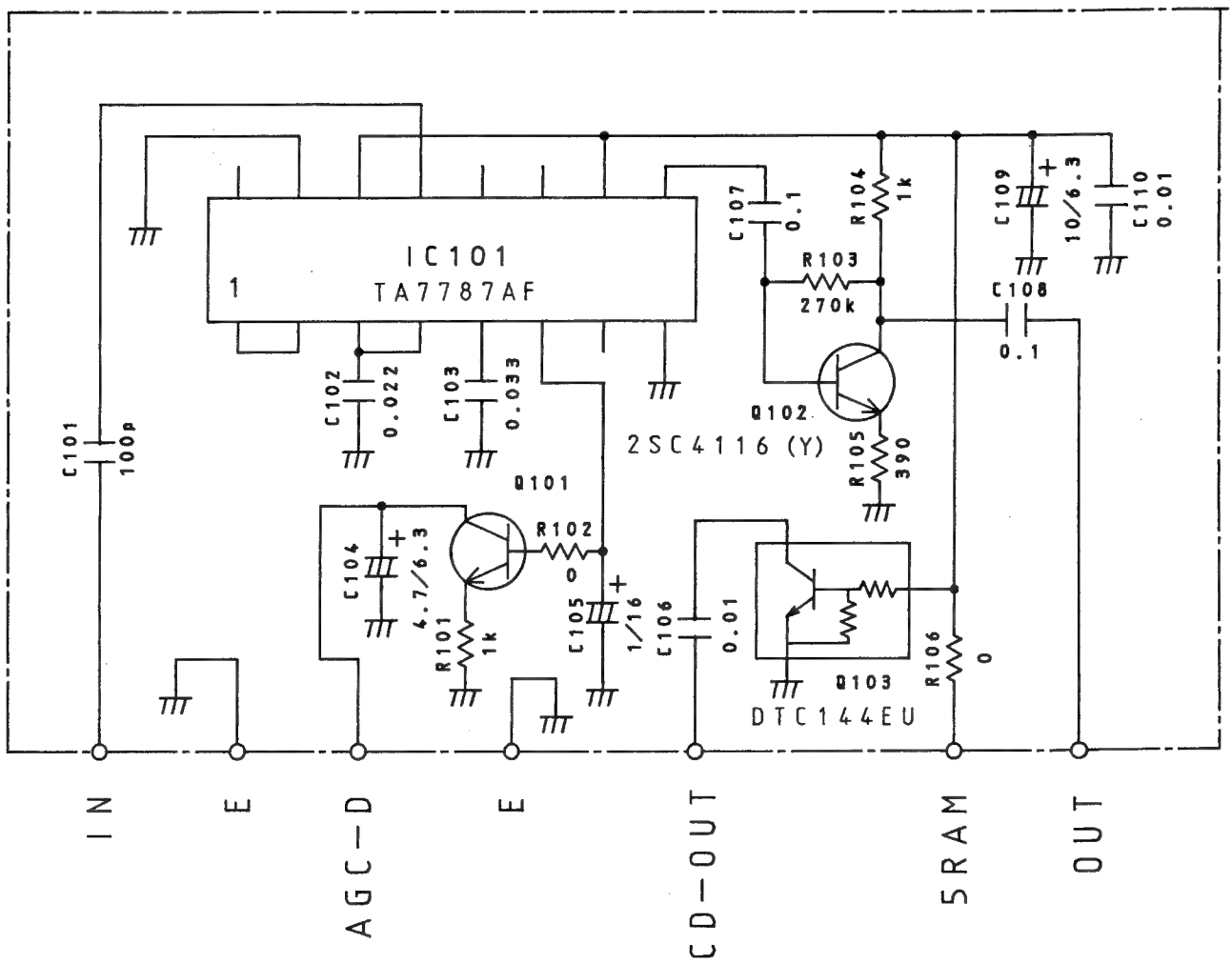




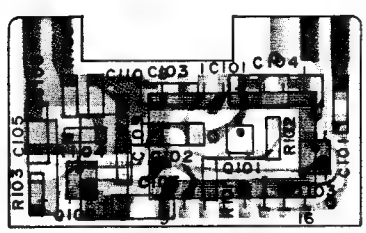
2SC4116

CIRCUIT DIAGRAM/PC BOARD VIEWS

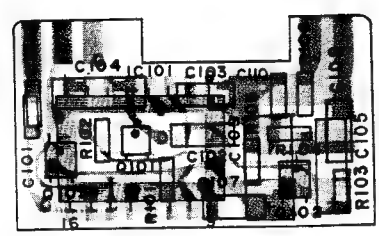
▼AM (X59-3810-00)(B)

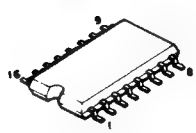


▼AM (X58-3810-00) (B)
Component side view



▼AM (X58-3810-00) (B)
Foil side view



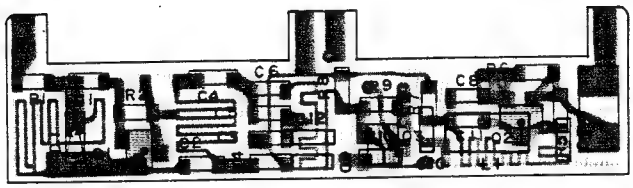


TA7787AF

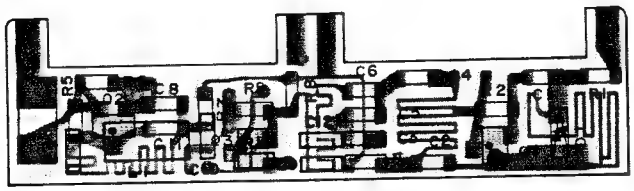
2SC4116
DTC144EU

PC BOARD VIEWS

▼ 800 MHz (X59-3810-00) (A) Component side view

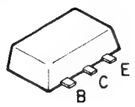


▼ 800 MHz (X59-3810-00) (A) Foil side view

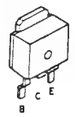


DTB113ZK
DTC144EU
2SC4116

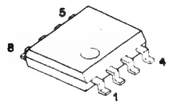
2SB798



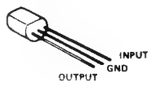
2SB1182F5



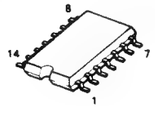
NJM386BM
NJM4560M



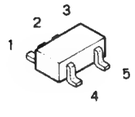
S-8054ALR-LN



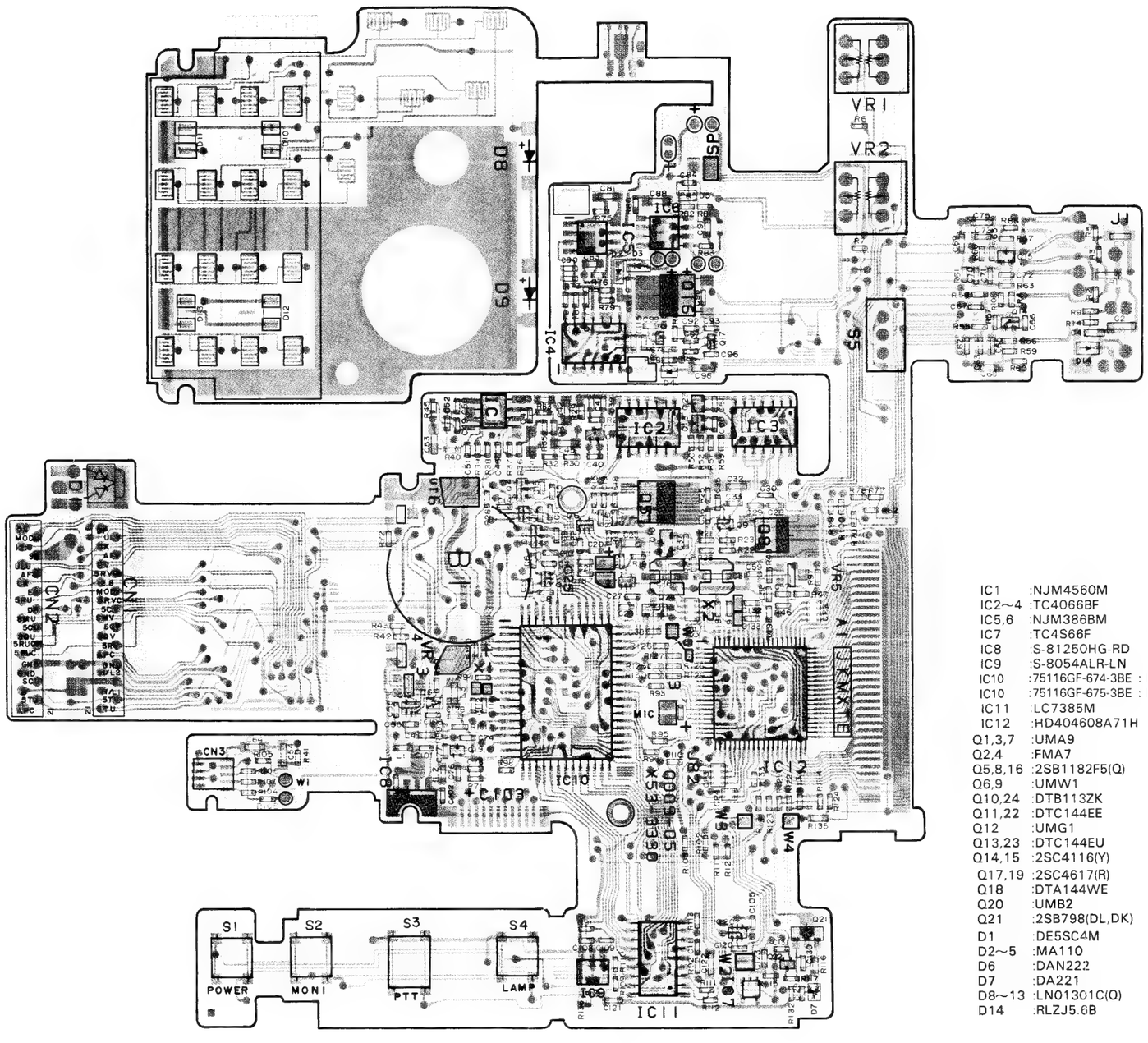
TC4066BF



TC4S66F



▼CONTROL UNIT (X53-333X-XX) Component side view
-11 : K, P -21 : M -51 : T, E1 -71 : X 2-71 : E2

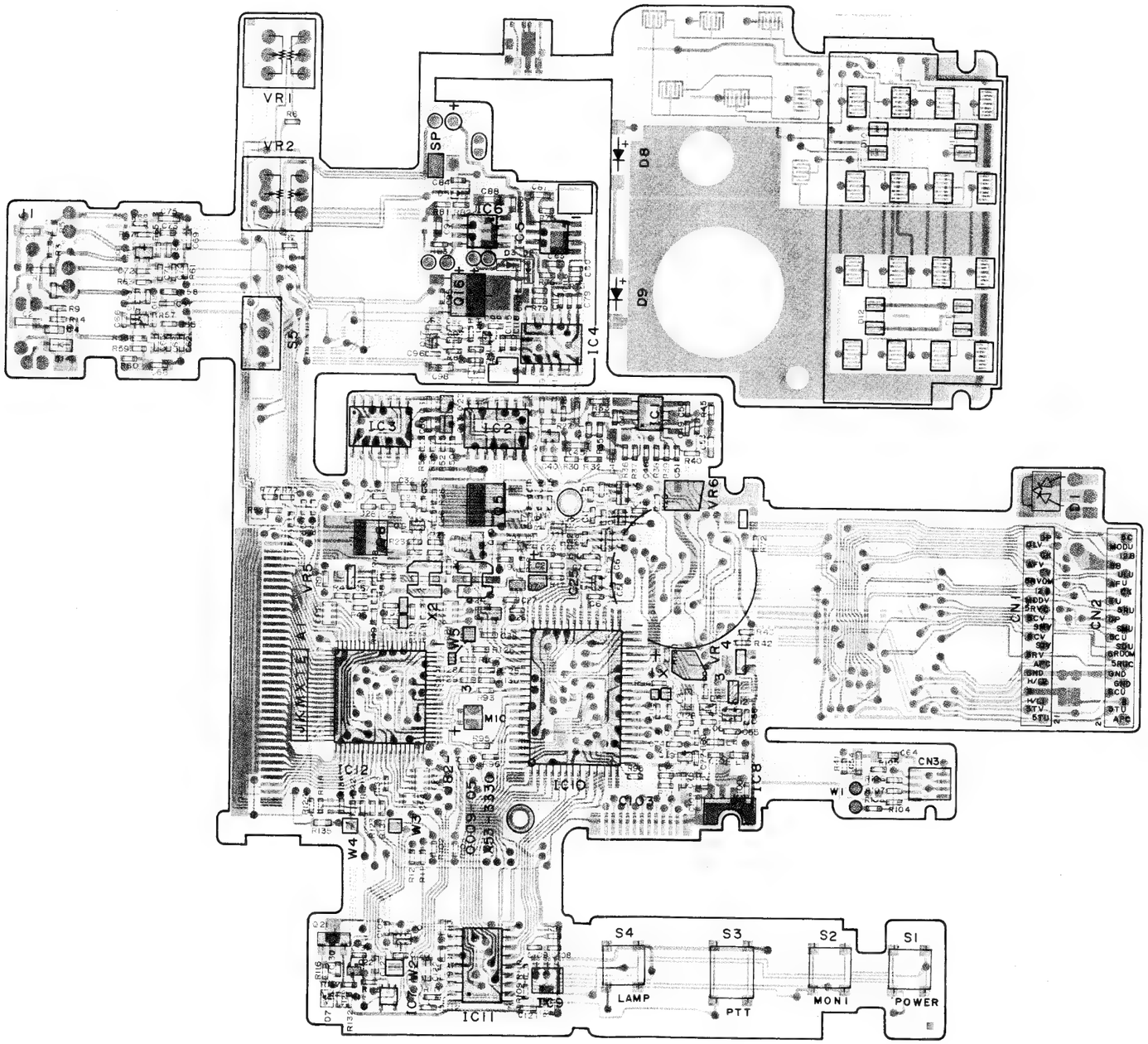


IC1 :NJM4560M
IC2~4 :TC4066BF
IC5,6 :NJM386BM
IC7 :TC4S66F
IC8 :S-81250HG-RD
IC9 :S-8054ALR-LN
IC10 :75116GF-674-3BE : M, T, X, E
IC10 :75116GF-675-3BE : K, P
IC11 :LC7385M
IC12 :HD404608A71H
Q1,3,7 :UMA9
Q2,4 :FMA7
Q5,8,16 :2SB1182F5(Q)
Q6,9 :UMW1
Q10,24 :DTB113ZK
Q11,22 :DTC144EE
Q12 :UMG1
Q13,23 :DTC144EU
Q14,15 :2SC4116(Y)
Q17,19 :2SC4617(R)
Q18 :DTA144WE
Q20 :UMB2
Q21 :2SB798(DL,DK)
D1 :DE5SC4M
D2~5 :MA110
D6 :DAN222
D7 :DA221
D8~13 :LN01301C(Q)
D14 :RLZJ5.6B

TH-77A/E PC BOARD VIEWS

▼CONTROL UNIT (X53-333X-XX) Foil side view

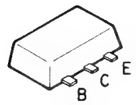
-11 : K, P -21 : M -51 : T, E1 -71 : X 2-71 : E2



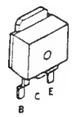
IC1	:NJM4560M
IC2~4	:TC4066BF
IC5,6	:NJM386BM
IC7	:TC4S66F
IC8	:S-81250HG-RD
IC9	:S-8054ALR-LN
IC10	:75116GF-674-3BE : M, T, X, E
IC10	:75116GF-675-3BE : K, P
IC11	:LC7385M
IC12	:HD404608A71H
Q1,3,7	:UMA9
Q2,4	:FMA7
Q5,8,16	:2SB1182F5(Q)
Q6,9	:UMW1
Q10,24	:DTB113ZK
Q11,22	:DTC144EE
Q12	:UMG1
Q13,23	:DTC144EU
Q14,15	:2SC4116(Y)
Q17,19	:2SC4617(R)
Q18	:DTA144WE
Q20	:UMB2
Q21	:2SB798(DL,DK)
D1	:DE5SC4M
D2~5	:MA110
D6	:DAN222
D7	:DA221
D8~13	:LN01301C(Q)
D14	:RLZJ5.6B

DTB113ZK
DTC144EU
2SC4116

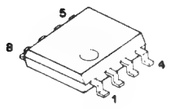
2SB798



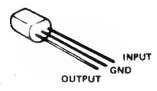
2SB1182F5



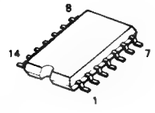
NJM386BM
NJM4560M



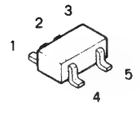
S-8054ALR-LN



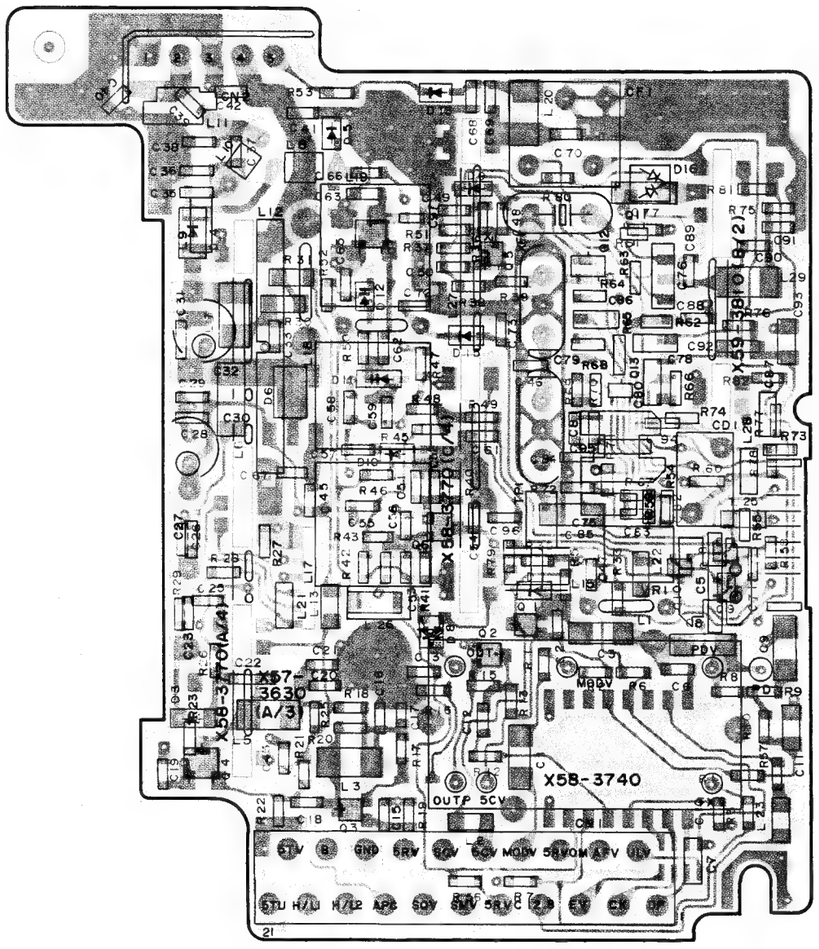
TC4066BF



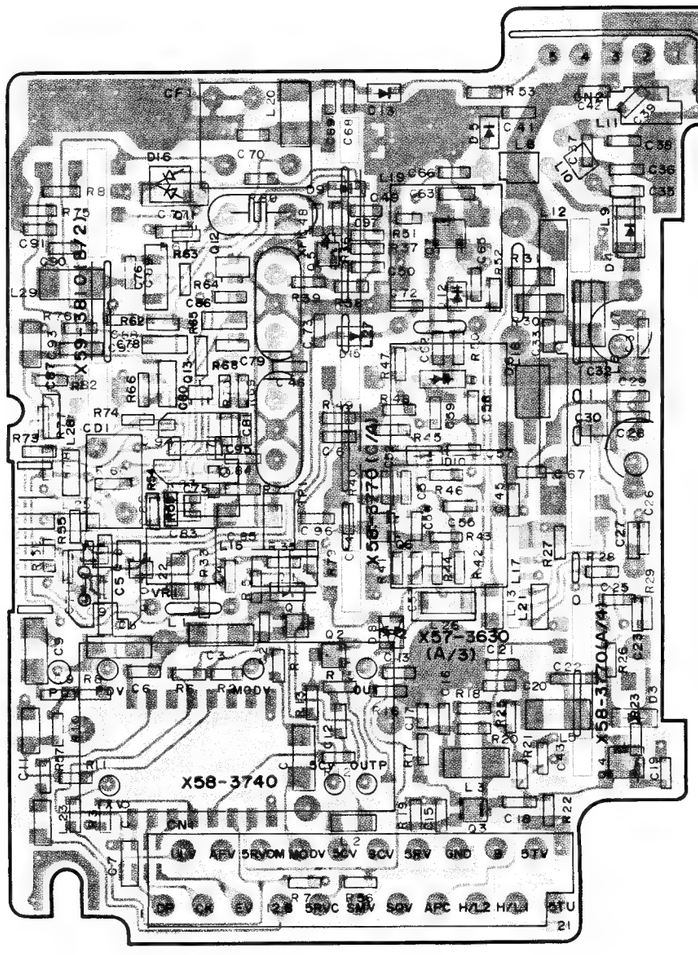
TC4S66F



▼TX-RX UNIT (X57-3630-XX) (RFV) Component side view
-11 : K, P -21 : M, T, X, E



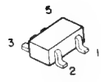
▼TX-RX UNIT (X57-3630-XX) (RFV) Foil side view
-11 : K, P -21 : M, T, X, E



DTA143EU
2SC4116
2SC4215
2SC4226

2SC4093

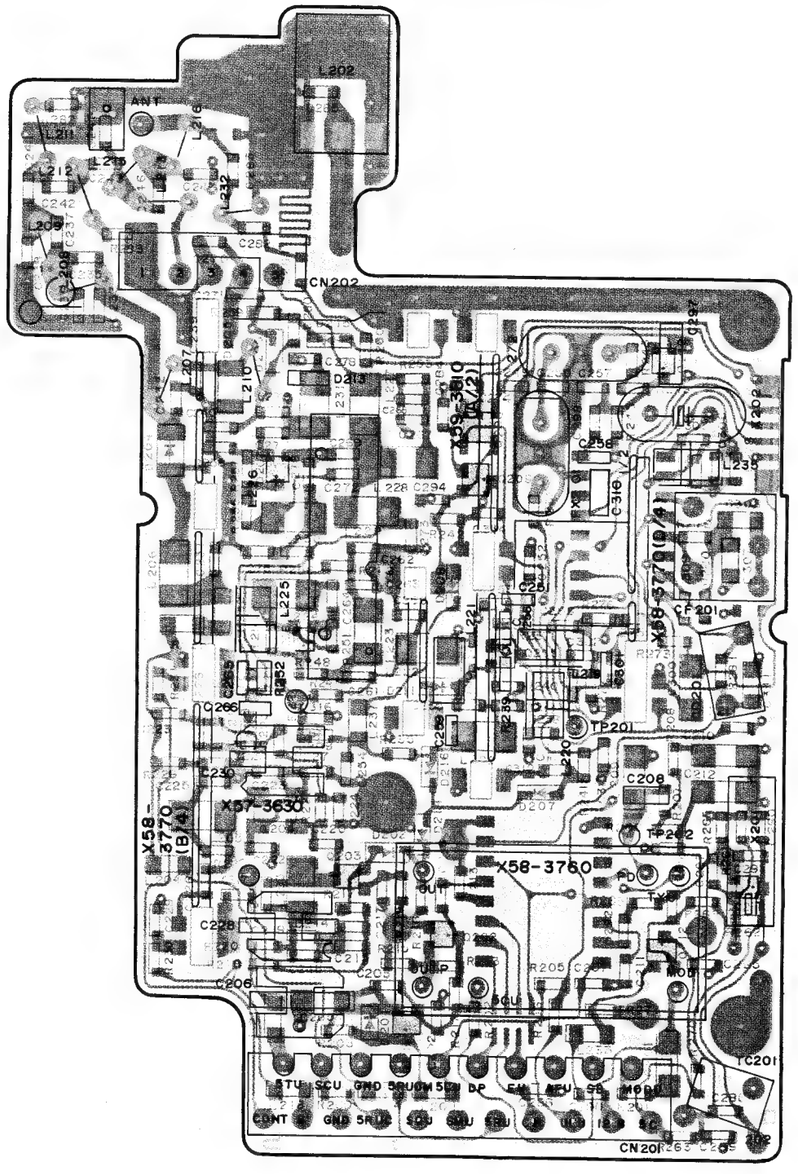
FMA1



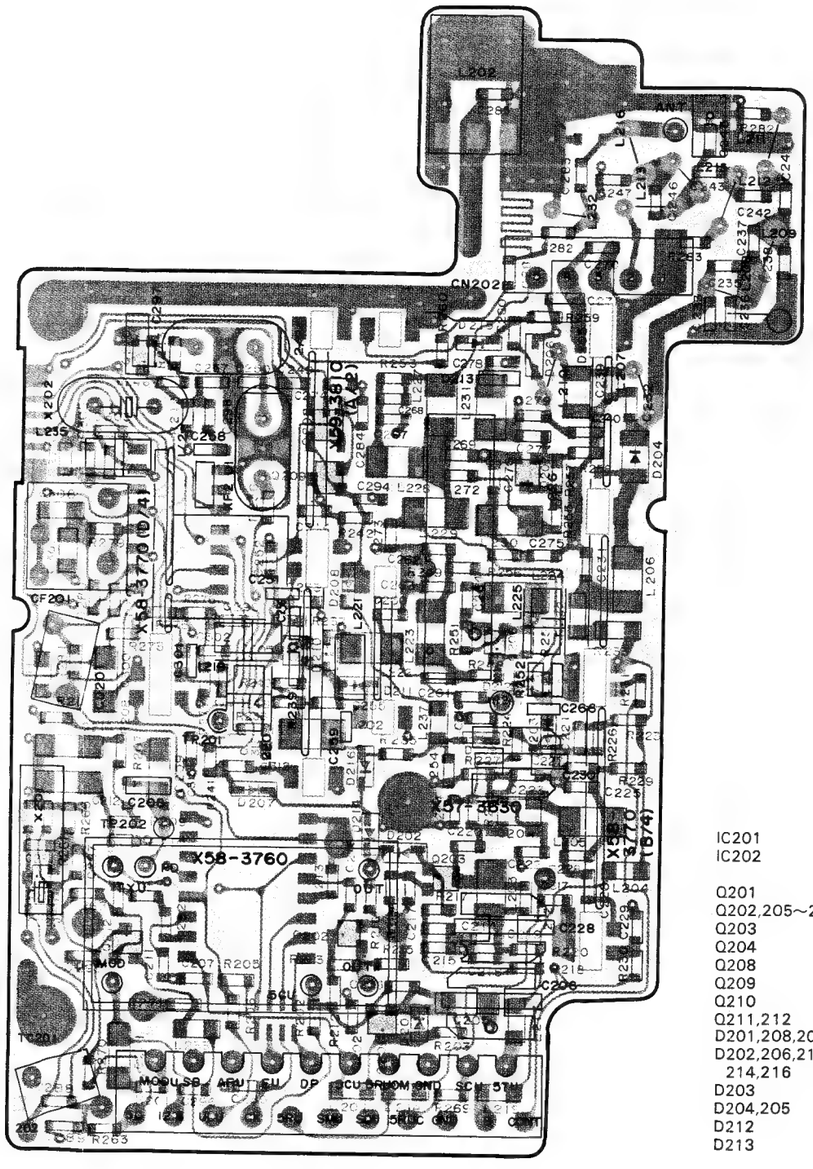
IC201	:M56760FP
IC202	:MC3372D
Q201	:2SC4117(BL)
Q202,205~207	:2SC4226(R24)
Q203	:2SC4226(R23,24)
Q204	:2SC4093(R26,27)
Q208	:FMAI
Q209	:DTA143EU
Q210	:2SC4215(Y)
Q211,212	:2SC4116(Y)
D201,208,209	:MA110
D202,206,210, 214,216	:MA77
D203	:DA204U
D204,205	:MI808
D212	:ISS300
D213	:HSM88AS

TH-77A/E PC BOARD VIEWS

▼TX-RX UNIT (X57-3630-XX) (RFU) Component side view
-11 : K, P -21 : M, T, X, E



▼TX-RX UNIT (X57-3630-XX) (RFU) Foil side view
-11 : K, P -21 : M, T, X, E

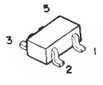


IC201	:M56760FP
IC202	:MC3372D
Q201	:2SC4117(BL)
Q202,205~207	:2SC4226(R24)
Q203	:2SC4226(R23,24)
Q204	:2SC4093(R26,27)
Q208	:FMAI
Q209	:DTA143EU
Q210	:2SC4215(Y)
Q211,212	:2SC4116(Y)
D201,208,209	:MA110
D202,206,210, 214,216	:MA77
D203	:DA204U
D204,205	:MI808
D212	:ISS300
D213	:HSM88AS

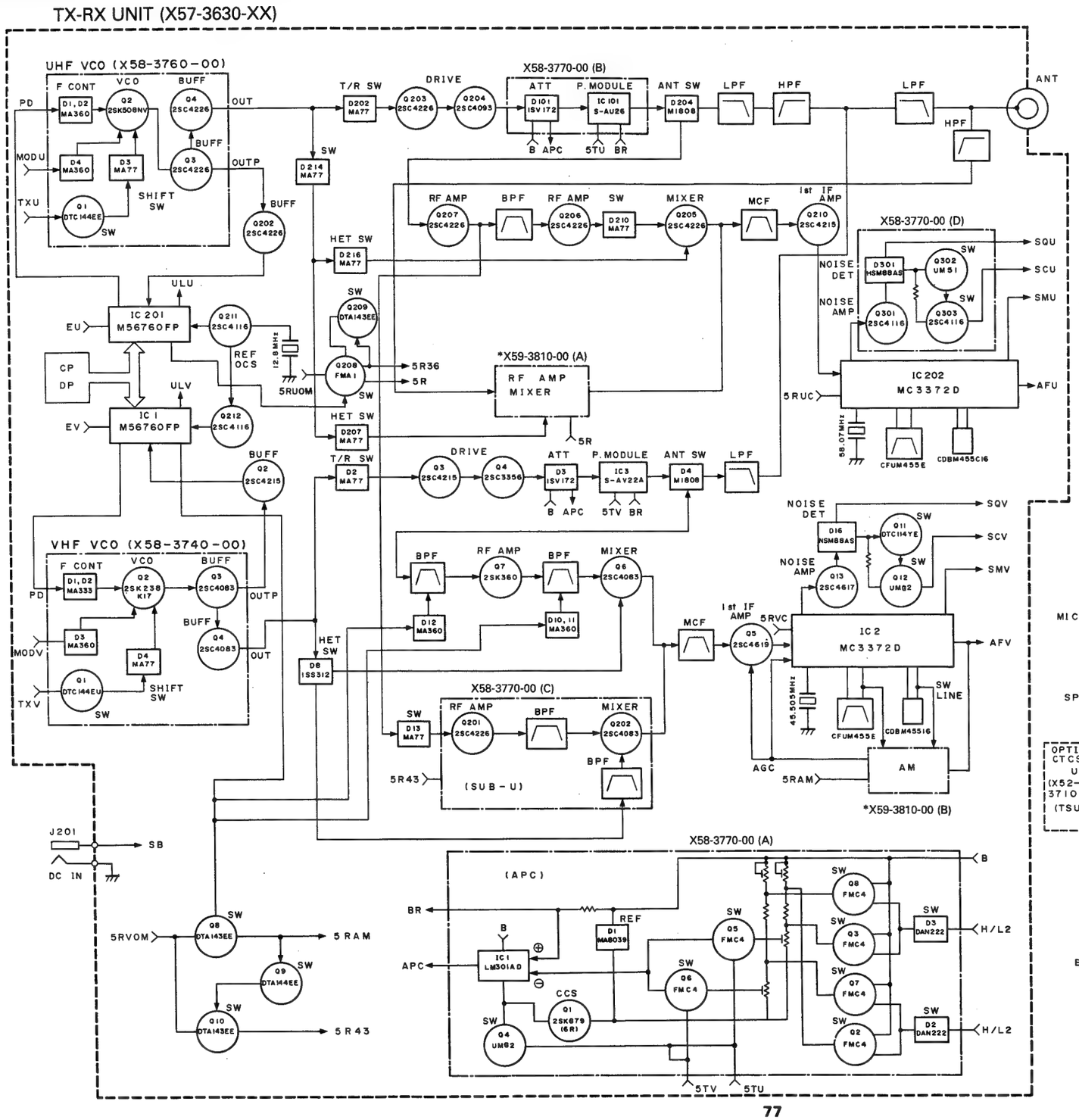
DTA143EU
2SC4116
2SC4215
2SC4226

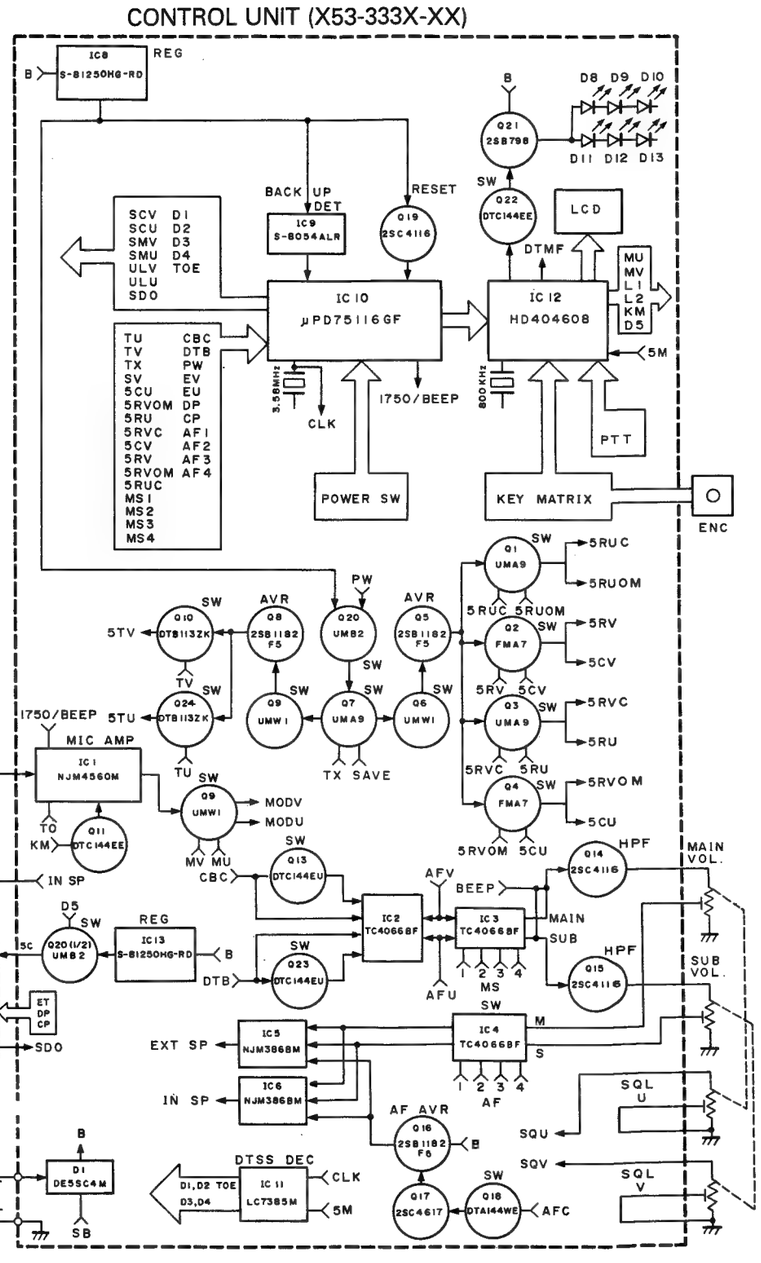
2SC4093

FMA1

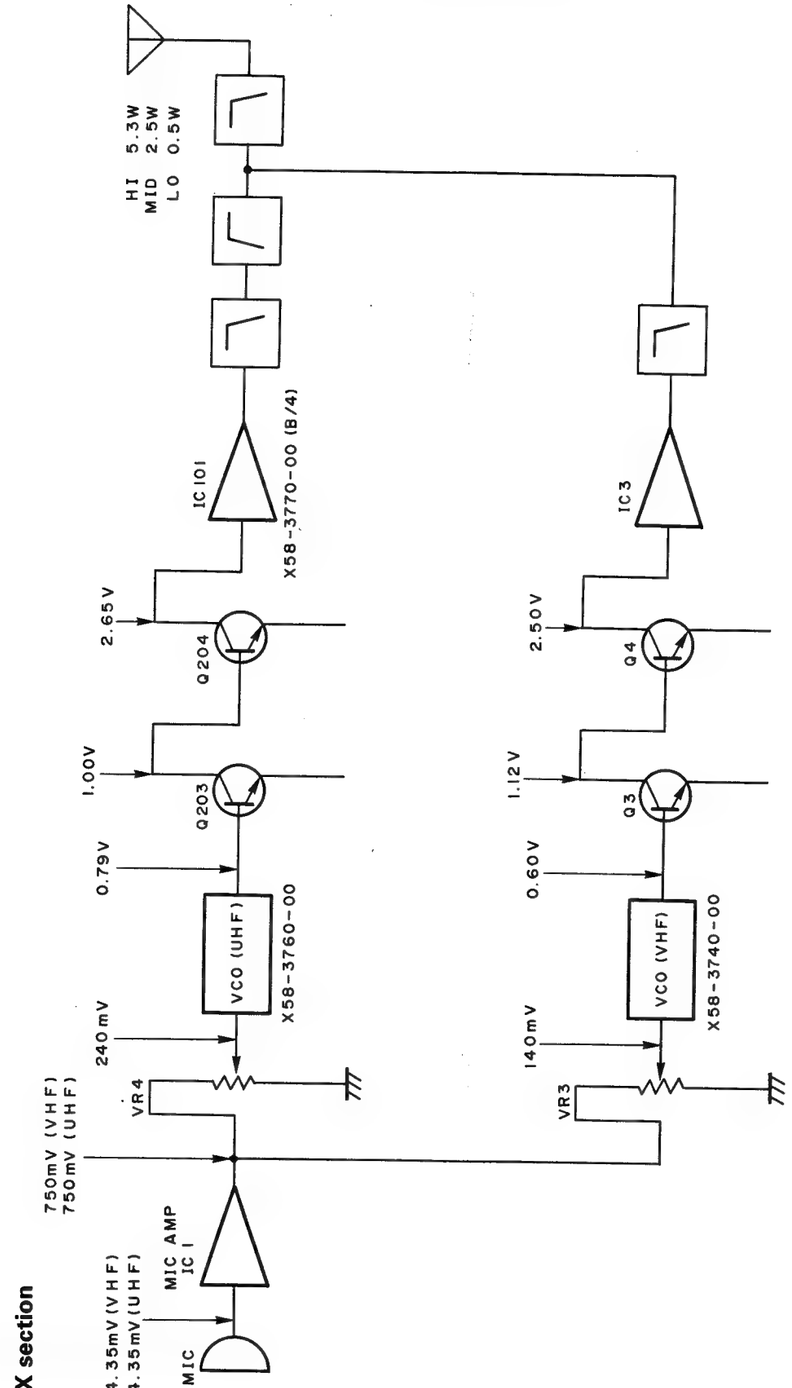


BLOCK DIAGRAM



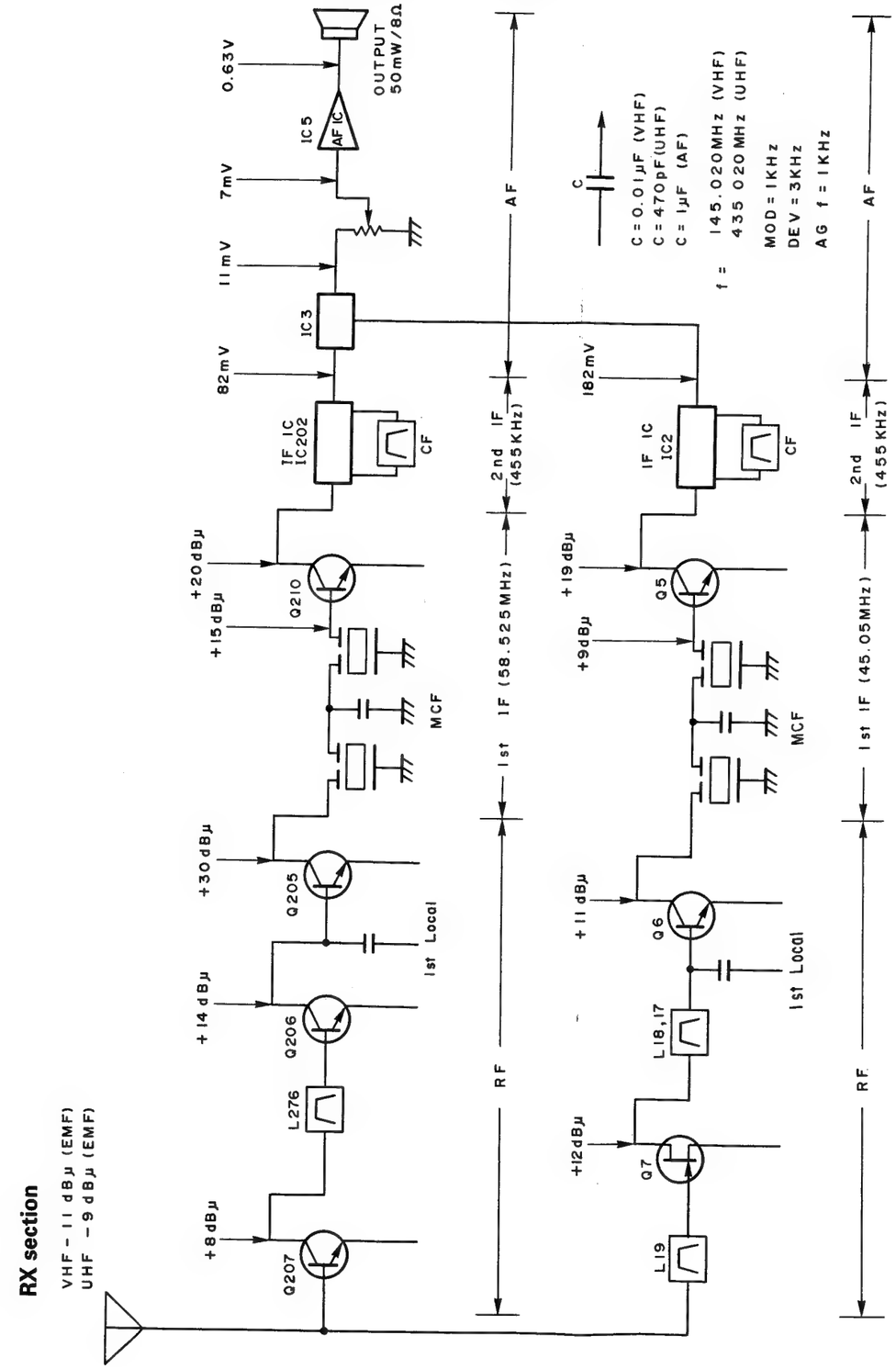


LEVEL DIAGRAM

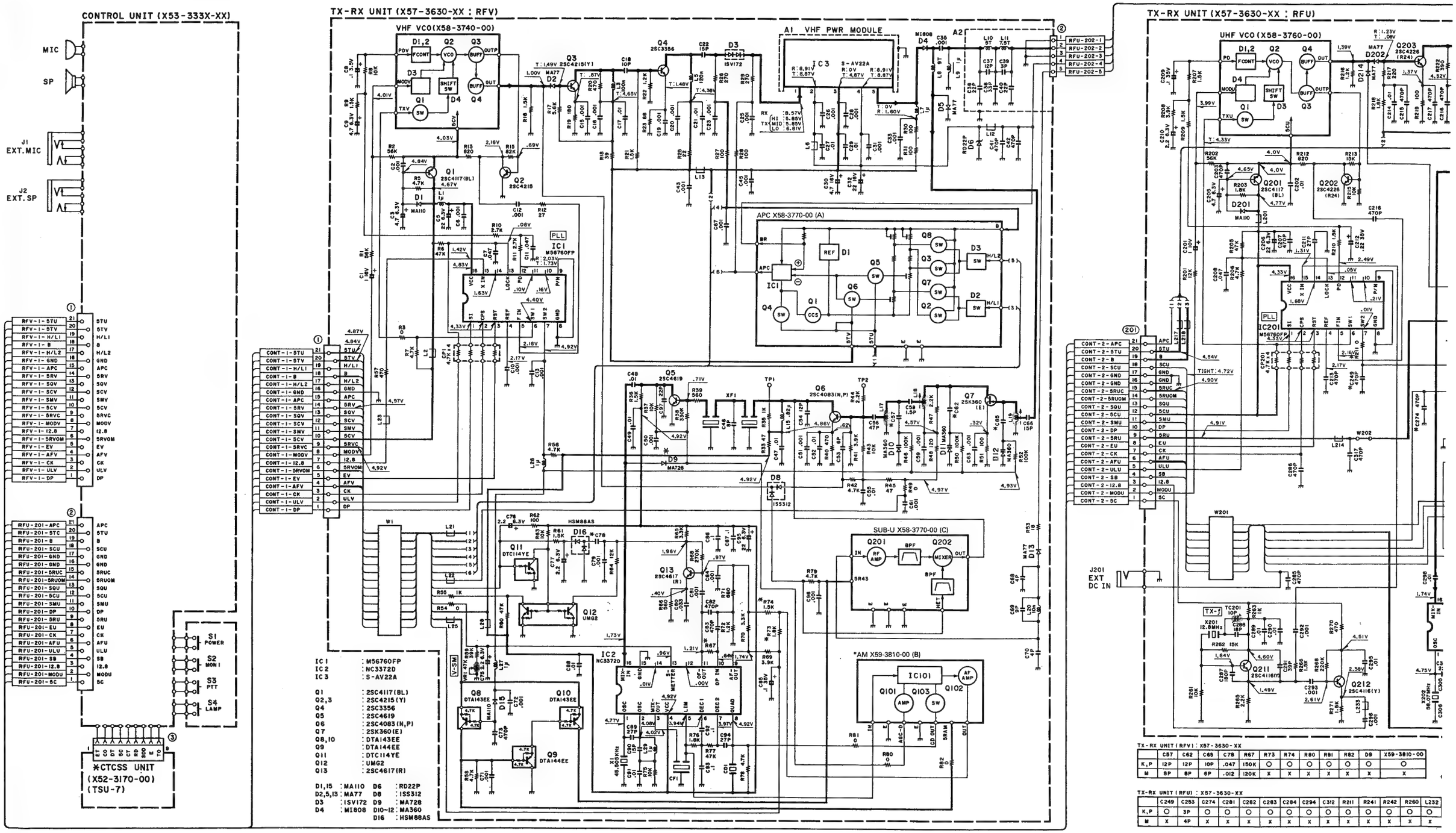


TH-77A/E

LEVEL DIAGRAM



SCHEMATIC DIAGRAM

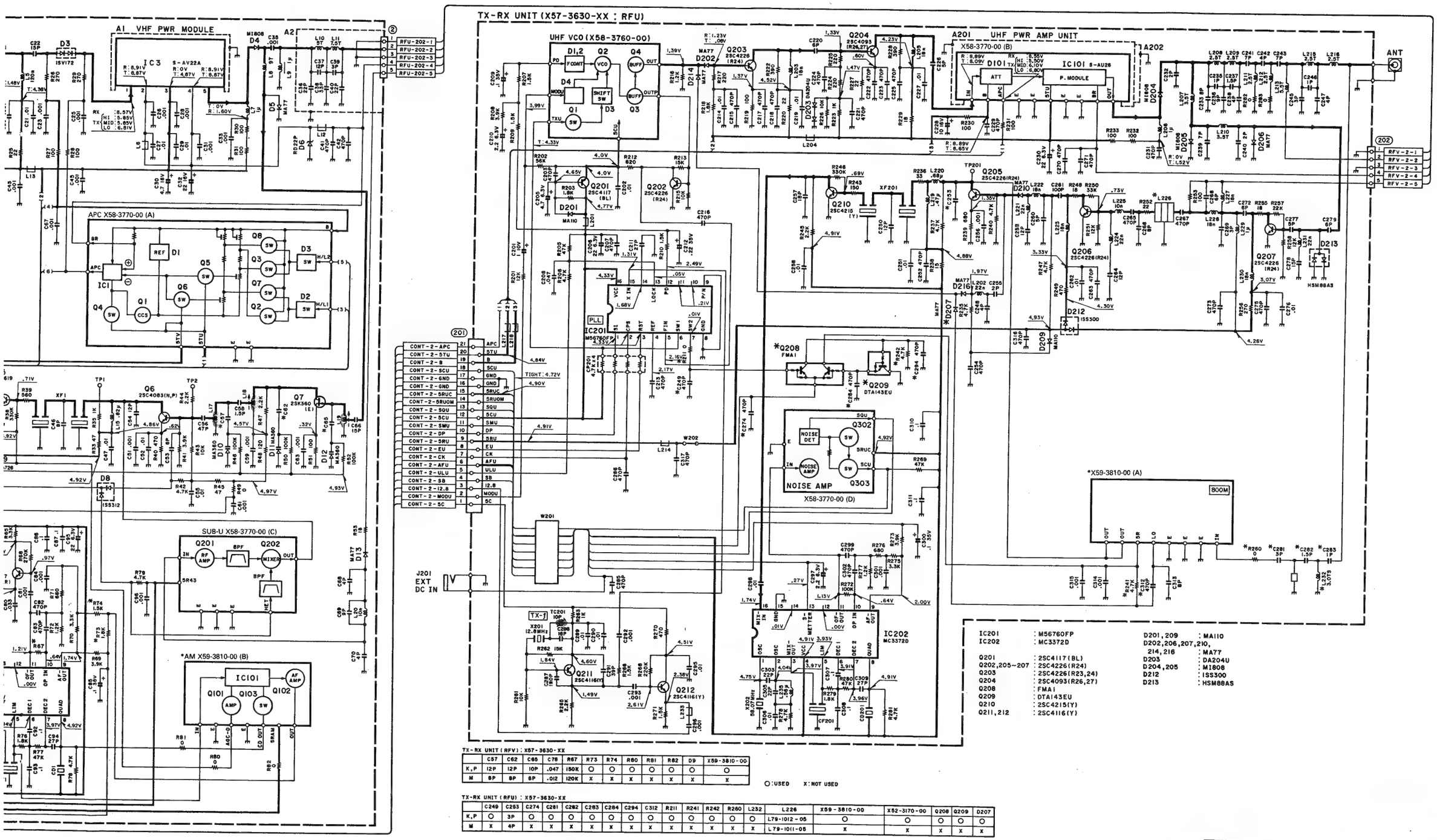


TX-RX UNIT (RFV) : X57-3630-XX

	C57	C62	C65	C78	R67	R73	R74	R80	R81	R82	D9	X59-3810-00
K,P	12P	12P	10P	.047	150K	○	○	○	○	○	○	○
M	8P	8P	6P	.012	120K	X	X	X	X	X	X	X

TX-RX UNIT (RFU) : X57-3630-XX

	C249	C253	C274	C281	C282	C283	C284	C294	C312	R211	R241	R242	R260	L232
K,P	○	3P	○	○	○	○	○	○	○	○	○	○	○	○
M	X	4P	X	X	X	X	X	X	X	X	X	X	X	X



TX-RX UNIT (RFV) : X57-3630-XX

	C57	C62	C65	C78	R67	R73	R74	R80	R81	R82	D9	X59-3810-00
K,P	12P	12P	10P	.047	150K	○	○	○	○	○	○	○
M	8P	8P	8P	.012	120K	X	X	X	X	X	X	X

○:USED X:NOT USED

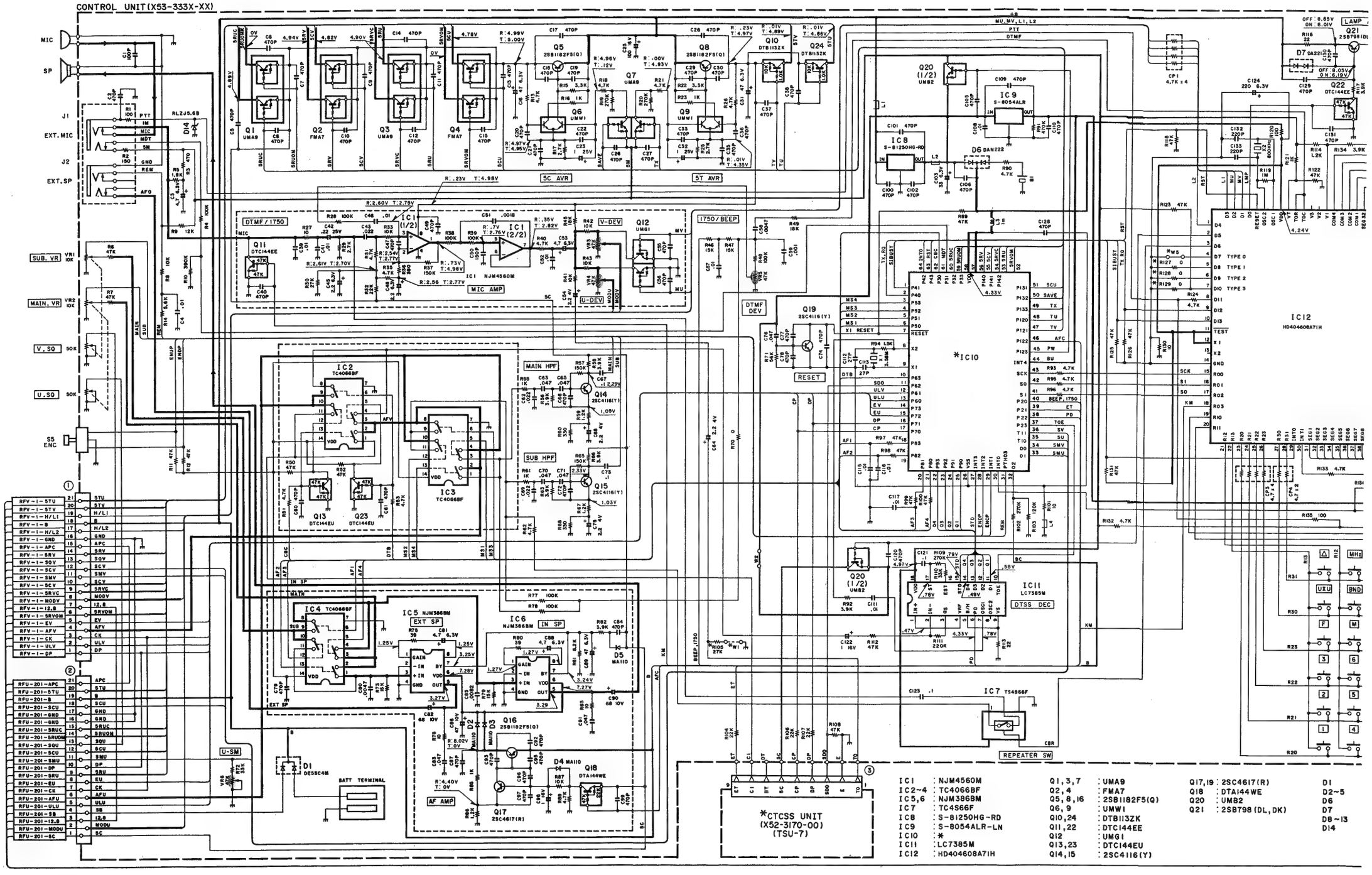
TX-RX UNIT (RFU) : X57-3630-XX

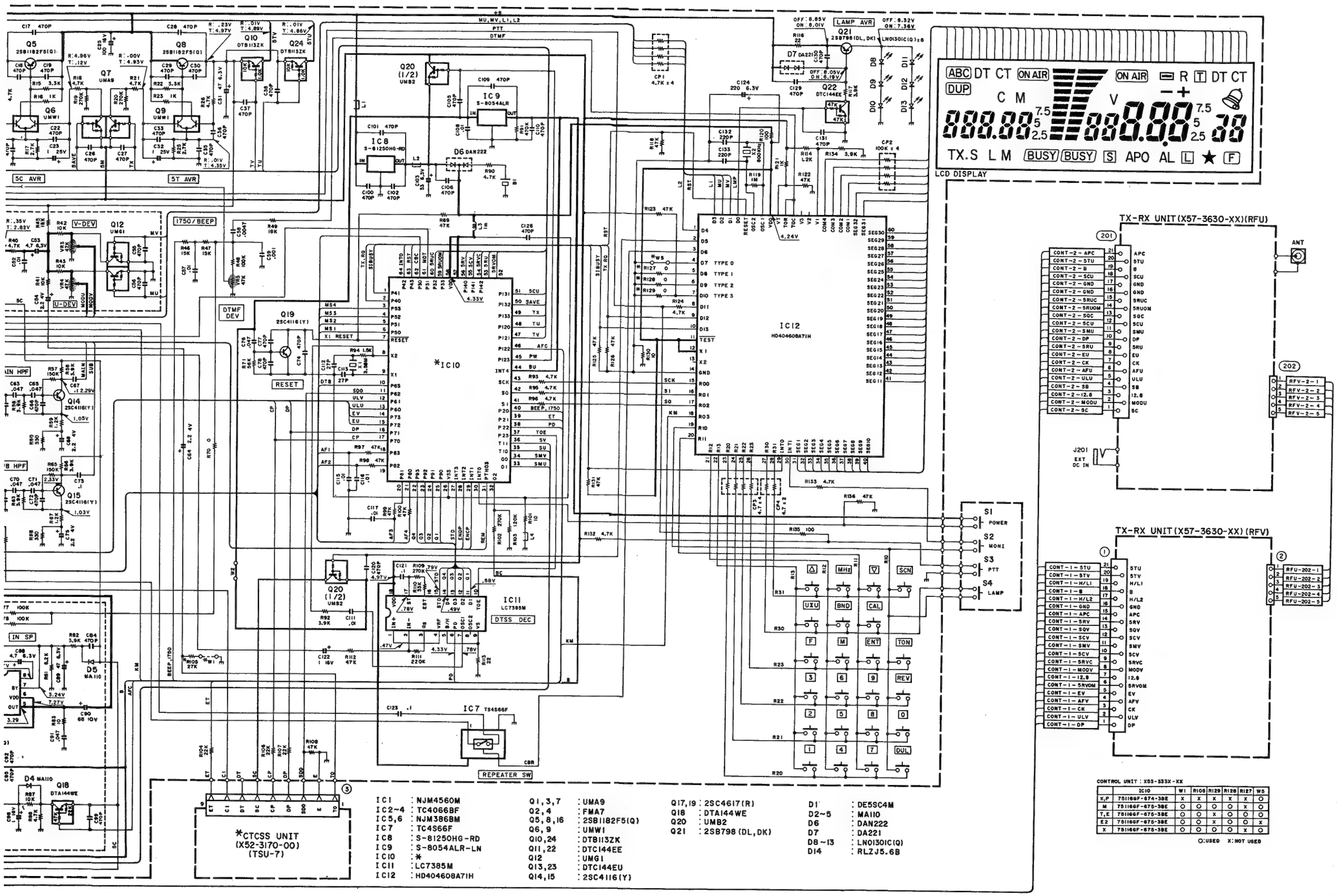
	C249	C253	C274	C281	C282	C283	C284	C294	C312	R211	R241	R242	R260	L232	L226	X59-3810-00	X52-3170-00	Q208	Q209	D207
K,P	○	3P	○	○	○	○	○	○	○	○	○	○	○	○	L79-1012-05	○	○	○	○	○
M	X	4P	X	X	X	X	X	X	X	X	X	X	X	X	L79-1011-05	X	X	X	X	X

TH-77A/E

KENWOOD

SCHEMATIC DIAGRAM





CONTROL UNIT : X53-333X-XX

	IC10	W1	R105	R129	R128	R127	W5
K,P	75116GF-674-3BE	X	X	X	X	X	O
M	75116GF-675-3BE	O	O	O	O	X	O
T,E	75116GF-675-3BE	O	O	X	O	O	O
E2	75116GF-675-3BE	O	O	X	O	O	X
X	75116GF-675-3BE	O	O	O	O	X	O

O:USED X:NOT USED

TH-77A/E

KENWOOD

TERMINAL FUNCTIONS

Pin Functions

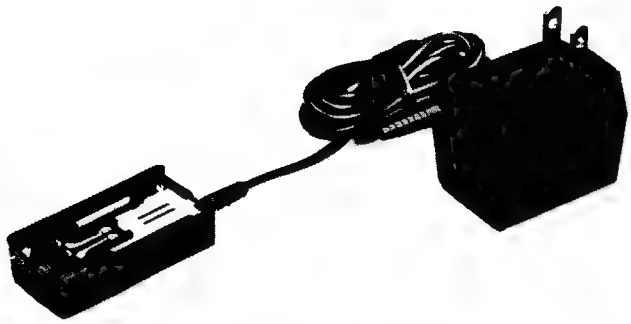
Connector No.	Pin No.	Name	Description
Control unit (X53-333X-XX)			
CN1 = CN1 (TX-RX unit RFV: X57-3630-XX)			
CN1	1	DP	VHF PLL circuit serial transmission data line
	2	ULV	VHF PLL unlock detection
	3	CK	VHF PLL circuit serial transmission clock line
	4	AFV	VHF (sub-UHF) audio output
	5	EV	VHF PLL circuit enable line
	6	5RVOM	Receiver block 5 V power supply
	7	12.8	12.8 MHz PLL reference oscillation input
	8	MODV	VHF modulation
	9	5RVC	Receiver common 5 V power supply
	10	5CV	PLL common 5 V power supply
	11	SMV	VHF/sub-UHF signal strength meter output
	12	SCV	Receiver busy signal (Low when squelch is open.)
	13	SQV	Squelch noise detection DC output
	14	5RV	VHF receiver block 5 V power supply
	15	APC	APC control line
	16	GND	Ground
	17	H/L2	APC power selection logic line
	18	B	Line B
	19	H/L1	APC power selection logic line
	20	5TV	VHF transmitter 5 V power supply
	21	5TU	APC daughter selection switch power supply
Control unit (X53-333X-XX)			
CN2 = CN201 (TX-RX unit RFU: X57-3630-XX)			
CN2	1	5CU	PLL common 5 V power supply
	2	MODU	UHF modulation
	3	12.8	12.8 MHz reference oscillation output
	4	SB	Input from external power pin
	5	ULU	UHF PLL unlock detection
	6	AFU	UHF 360/800 AF output
	7	CK	UHF PLL circuit serial transmission clock line
	8	EU	UHF PLL circuit enable line
	9	5RU	UHF receiver block 5 V power supply
	10	DP	UHF PLL circuit serial transmission data line
	11	SMU	UHF/360/800 signal strength meter output
	12	5CU	PLL common 5 V power supply
	13	SQU	Squelch noise detection DC output
	14	5RUOM	800 5 V power supply
	15	5RUC	UHF/800 common 5 V power supply
	16	GND	Ground
	17	GND	Ground
	18	SCU	Receiver busy signal (Low when squelch is open.)
	19	B	Line B
	20	5TU	UHF transmitter block 5 V power supply
	21	APC	UHF APC control line

Connector No.	Pin No.	Name	Description
Control unit (X53-333X-XX)			
CN3	1	TO	Tone signal output
	2	E	Ground
	3	SDO	Tone signal coincidence discrimination signal (High: Coincides)
	4	DP	Data signal
	5	CP	Clock signal
	6	5C	5 V power supply
	7	DT	Tone serial data
	8	CI	Audio signal input
	9	ET	Tone enable
TX-RX UNIT RFU (X57-3630-XX)			
CN202 = CN2 (TX-RX unit RFU)			
CN202	1	GND	Ground
	2	VHF	VHF signal input/output
	3	GND	Ground
	4	RB	APC power detection line B
	5	SUB	Sub-receive signal

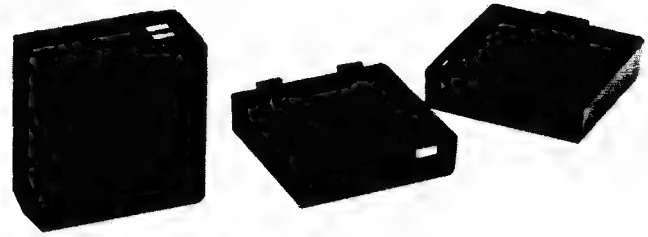
TH-77A/E

BC-9 (BATTERY CHARGER)
BT-6 (AAA MANGANESE / ALKALINE BATTERY CASE)

BC-9 EXTERNAL VIEW



BT-6 EXTERNAL VIEW



BC-9 PARTS LIST

* : New Parts

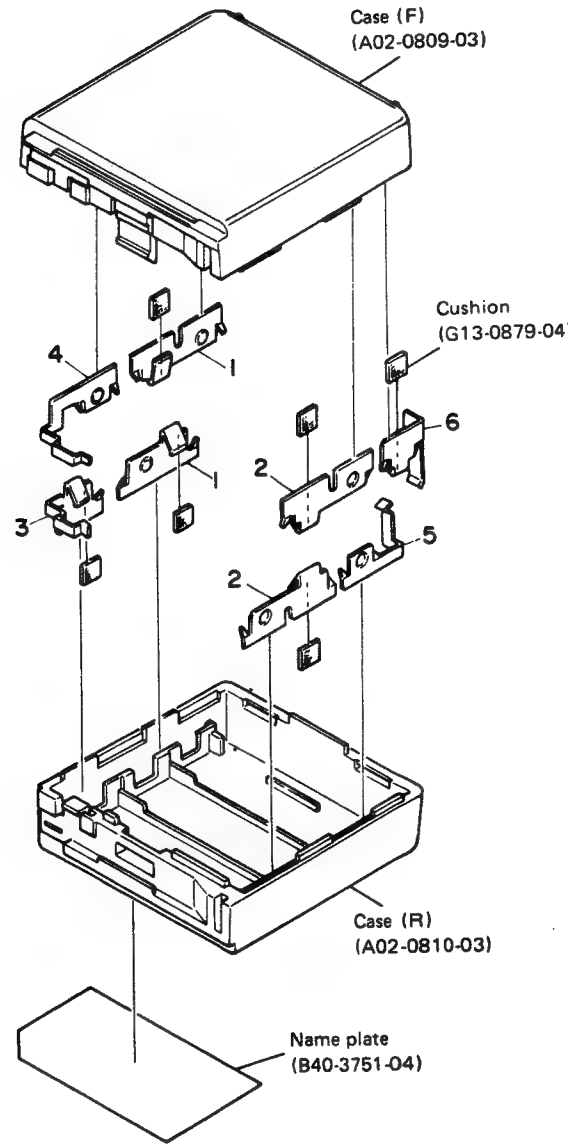
Ref. No.	New Parts	Parts No.	Description
		A02-0814-03	Case (Charge adapter)
		A40-0622-04	Bottom plate
		B42-3301-04	Label (LA) **(K)**
		E23-0494-04	Terminal ⊖
		E23-0605-04	Terminal ⊕
		G13-0852-04	Cushion
		J19-1426-03	Terminal holder

BT-6 PARTS LIST

* : New Parts

Ref. No.	New Parts	Parts No.	Description
1		E23-0496-04	Terminal A
2		E23-0497-04	Terminal B
3		E23-0498-04	Terminal C
4		E23-0499-04	Terminal D
5		E23-0500-04	Terminal E
6		E23-0601-04	Terminal F

BT-6 DISASSEMBLY



BC-10 (COMPACT CHARGER)

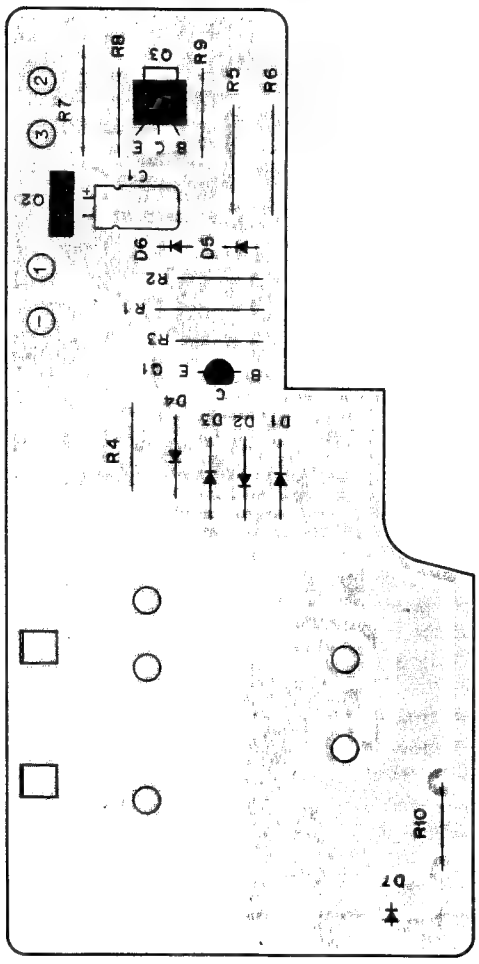
BC-10 EXTERNAL VIEW

BC-10 PARTS LIST

* : New Parts

Ref. No.	New Parts	Parts No.	Description
		A02-0828-08	Case (Upper) **K,M,M2**
		A02-0829-08	Case (Upper) **X,T,W**
		A02-0832-08	Case (Lower)
D7		B30-0858-08	LED SR615D
		B50-8203-08	Instruction manual **K,M,M2,X,W**
		B50-8204-08	Instruction manual **T**
		E30-2097-08	AC power cord **K,M,M2**
		E30-2098-08	AC power cord **X**
		E30-2099-08	AC power cord **T**
		E30-2100-08	AC power cord **W**
		L01-8027-08	Power transformer 220V **M,W**
		L01-8111-08	Power transformer 120V **K,M2**
		L01-8152-08	Power transformer 240V **X,T**
		W02-0805-08	Module
Q1		2SA1115(E)	Transistor
Q2		2SA1241(Y)	Transistor
Q3		2SC3076	Transistor
D1–4		DSF-10TB	Diode
D5, 6		1SS133	Diode

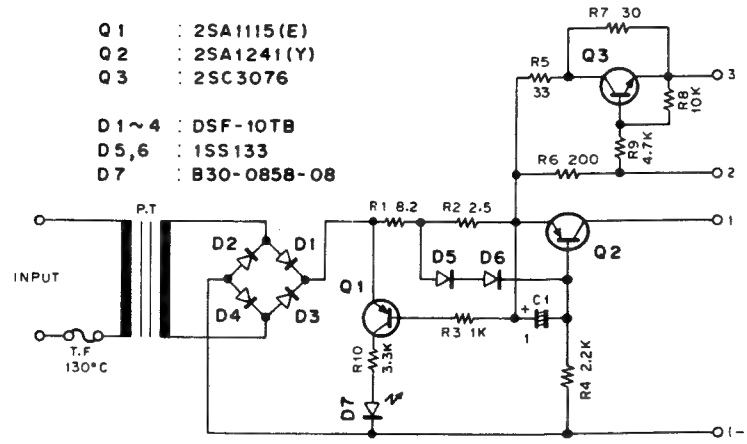
BC-10 PC BOARD VIEW



BC-10 CIRCUIT DIAGRAM

Q1 : 2SA1115(E)
Q2 : 2SA1241(Y)
Q3 : 2SC3076

D1~4 : DSF-10TB
D5,6 : 1SS133
D7 : B30-0858-08



BC-11 (RAPID CHARGER)

* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Telle ohne Parts No. werden nicht geliefert.

BC-11 PARTS LIST

	Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
				BC-11			
	1	1A		A02-0815-08	CASE		
	2	1A,1B		A02-0817-08	BATTERY POCKET		
	3	1B		B46-0411-00	WARRANTY CARD	K	
	4	1B		B50-8134-08	INSTRUCTION MANUAL		
	5	1B		E23-0604-05	TERMINAL		
⚠	6	2A		E30-2038-08	AC CORD	K,M,M2	
⚠	6	2A		E30-2072-08	AC CORD	W	
⚠	6	2A		E30-2073-08	AC CORD	T	
⚠	6	2A		E30-2095-08	AC CORD	X	
	8	2B		H01-8128-08	ITEM CARTON CASE		
	9	2B		H10-2584-02	POLYSTYRENE FOAMED FIXTURE (L)		
	10	2B		H10-2585-02	POLYSTYRENE FOAMED FIXTURE (R)		
	11	3A		J02-0439-05	FOOT		
	12	3A		J39-0424-05	SPACER		
⚠	T1	2A		L01-8081-08	POWER TRANSFORMER (AC120V)	K,M2	
⚠	T1	2A		L01-8112-08	POWER TRANSFORMER (AC220V)	M,W	
⚠	T1	2A		L01-8122-08	POWER TRANSFORMER (AC240V)	T,X	
	A	3A		N30-3006-41	MACHINE SCREW (M3 X 6)		
	B	2A,1B		N34-4006-46	MACHINE SCREW (M4 X 6 TR)		
	C	2A,1B		N35-4006-45	MACHINE SCREW (M4 X 6 BI) BLK		
	D	2A		N87-3008-46	TAPTITE SCREW (φ3 X 8 BR)		
	E	1A		N89-3008-45	TAPTITE SCREW (φ3 X 8 BI) BLK		
	SW1	3A		S36-1407-05	POWER SW		
	7	3B		W02-0399-08	CHARGE CONTROL UNIT		
				CHARGE CONTROL UNIT (W02-0399-08)			
	C1			CE04EW1V222M	ELECTRO 2200μF 35WV		
	C2			CE04EW1C470M	ELECTRO 47μF 16WV		
	C3			CE04EW1H010M	ELECTRO 1μF 50WV		
	C4			CE04EW1E471M	ELECTRO 470μF 25WV		
	C5,6			CE04EW1C100M	ELECTRO 10μF 16WV		
	C7			CE04EW1A101M	ELECTRO 100μF 10WV		
	C8			CE04EW1C100M	ELECTRO 10μF 16WV		
	C9,10			CE04EW0J101M	ELECTRO 100μF 6.3WV		
	C11			CE04EW1C330M	ELECTRO 33μF 16WV		
	C12			CK45B1H102K	CERAMIC 0.001μF 50WV		
	C14			CE04EW1H010M	ELECTRO 1μF 50WV		

E: Scandinavia & Europe H:Audio Club K: USA P: Canada W:Europe
A: Saudi Arabia T: England U: PX(Far East, Hawaii)
UE: AAFES(Europe) X: Australia M: Other Areas

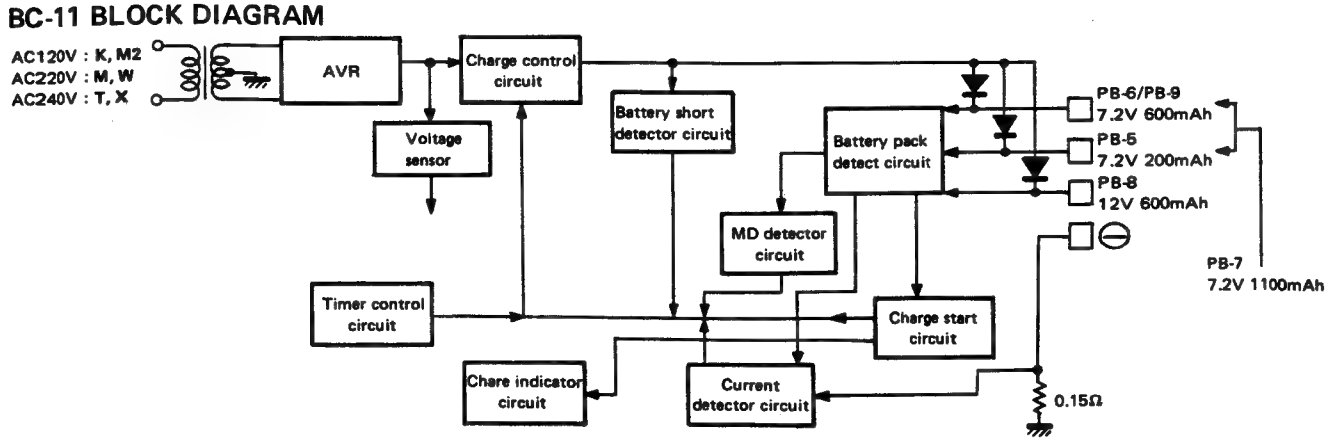
⚠ indicates safety critical components.

BC-11 (RAPID CHARGER)

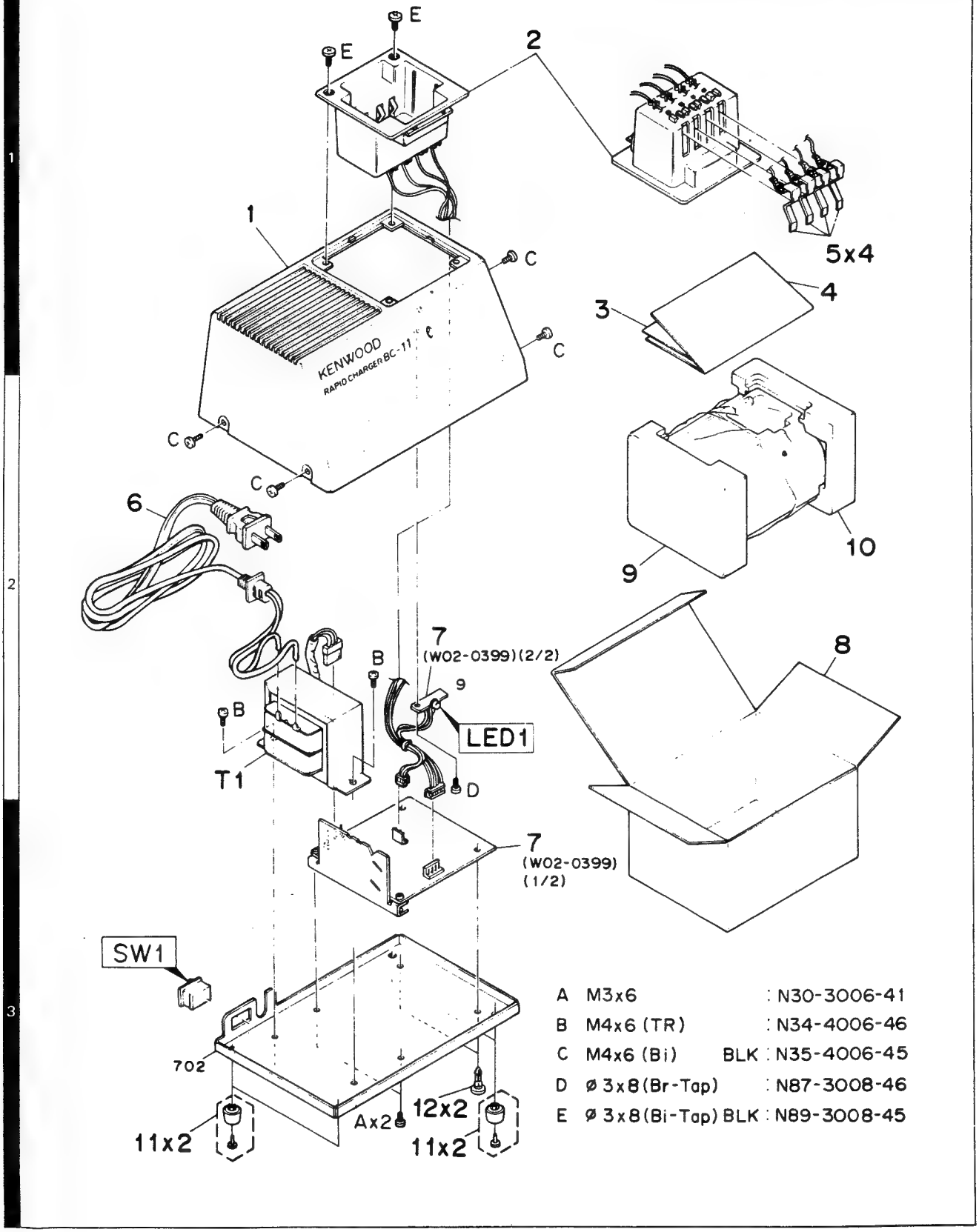
* New Parts
Parts without Parts No. are not supplied.
Les articles non mentionnes dans le Parts No. ne sont pas fournis.
Teile ohne Parts No. werden nicht geliefert.

	Ref. No. 参照番号	Address 位置	New Parts 新	Parts No. 部品番号	Description 部品名／規格	Destination 仕向	Remarks 備考
	MD			C91-1038-08	ELECTRO		
⚠	F1			F05-2525-05	FUSE (2.5A)	W,X	
⚠	F1			F06-2522-05	FUSE (2.5A)	M,M2,T	
⚠	F1			F06-2523-05	FUSE (2.5A)	K	
	–			J13-0039-05	FUSE HOLDER	W	
	L1			L33-0694-08	CHOKE COIL (470μH)		
	R1			R92-0683-08	FL-PROOF 0.15Ω 4W		
	D1–5			DSA26B	DIODE		
	D6–16			DS442	DIODE		
	D19–21			DS442	DIODE		
	DZ1			GZA11Y	ZENER DIODE (11V)		
	DZ2–4			GZA10Z	ZENER DIODE (10V)		
	DZ5			GZA2.0X	ZENER DIODE (2V)		
	DZ6			GZA5.6X	ZENER DIODE (5.6V)		
	DZ7			GZA7.5Y	ZENER DIODE (7.5V)		
	DZ8			GZA3.0X	ZENER DIODE (3V)		
	IC1			STK772B	IC (CHOPPER REGULATOR)		
	IC2			KCH-1003	IC (VOLTAGE SENSOR)		
	IC3			AN6780	IC (TIMER)		
	IC4			LA6393S	IC (DUAL OP IC)		
	IC5			LC4011B	IC (QUADRUPLE NAND GATE)		
	Q1			2SD600F,KF	TRANSISTOR		
	Q2–5			2SA608E,F	TRANSISTOR		
	Q6			2SC536E,F	TRANSISTOR		
	Q7			2SA608E,F	TRANSISTOR		
	Q8–10			2SC536E,F	TRANSISTOR		
	Q11,12			2SA608E,F	TRANSISTOR		
	Q13,14			2SC536E,F	TRANSISTOR		
	LED1	2A		SLP-540D	LED (RED/GRN)		

BC-11 BLOCK DIAGRAM



BC-11 (RAPID CHARGER)

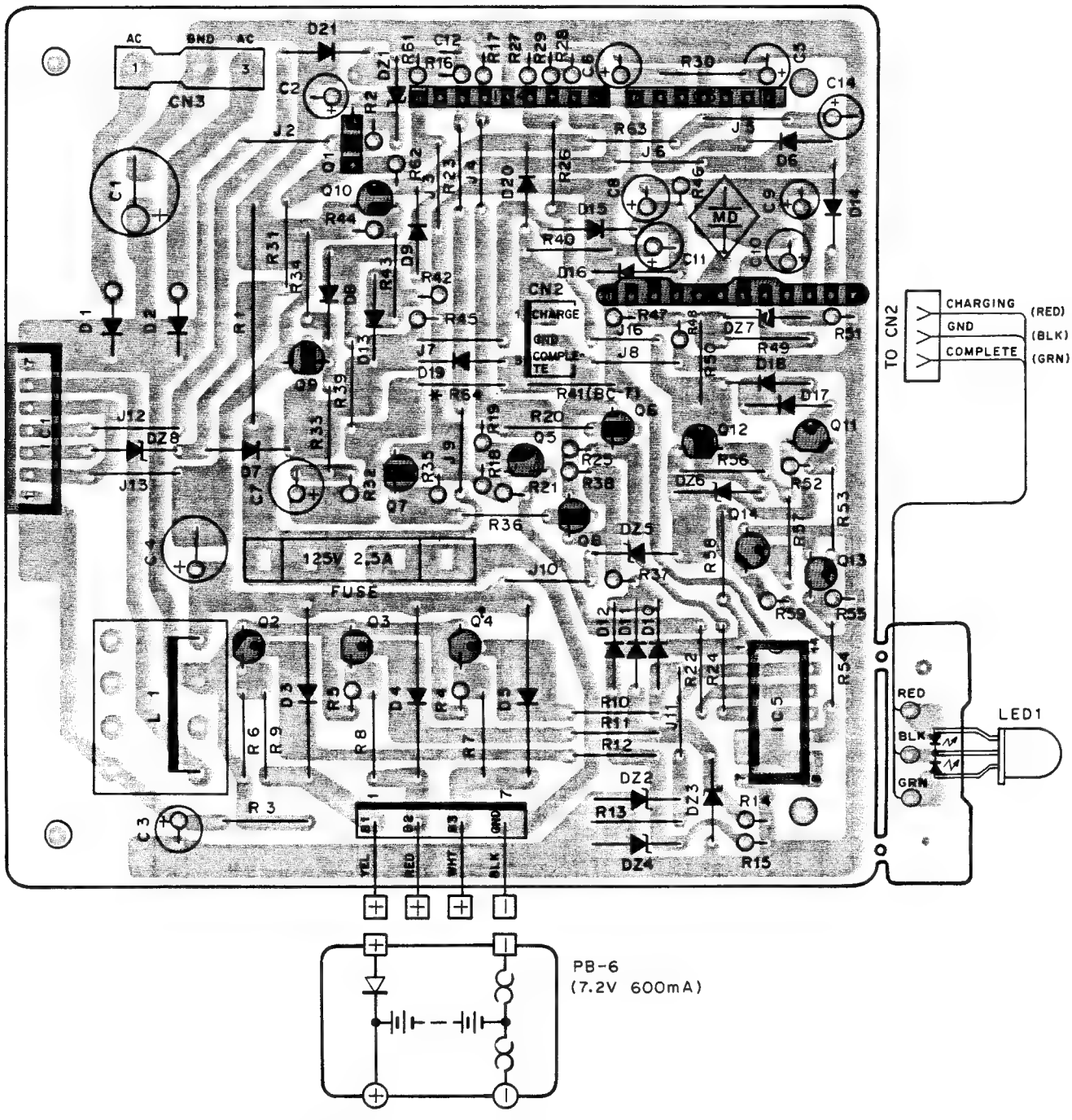


A	M3x6		: N30-3006-41
B	M4x6 (TR)		: N34-4006-46
C	M4x6 (Bi)	BLK	: N35-4006-45
D	ø 3x8 (Br-Tap)		: N87-3008-46
E	ø 3x8 (Bi-Tap)	BLK	: N89-3008-45

Parts with the exploded numbers larger than 700 are not supplied.

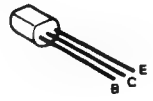
BC-11 (RAPID CHARGER)

BC-11 PC BOARD VIEW

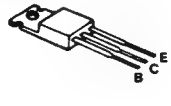


Q1 : 2SD600F,KF Q2–5,7,11,12 : 2SA608E,F Q6,8–10,13,14 : 2SC536E,F
IC1 : STK772B IC2 : KCH-1003 IC3 : AN6780 IC4 : LA6393S IC5 : LC4011B
D1–5 : DSA26B D6–16,19–21 : DS442
DZ1 : GZA11Y DZ2–4 : GZA10Z DZ5 : GZA2.0X DZ6 : GZA5.6X DZ7 : GZA7.5Y DZ8 : GZA3.0X

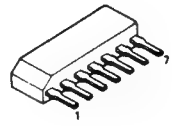
2SA608E
2SA608F



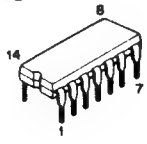
2SC536E 2SD600F
2SC536F 2SD600KF



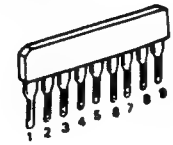
AN6780



LC4011B

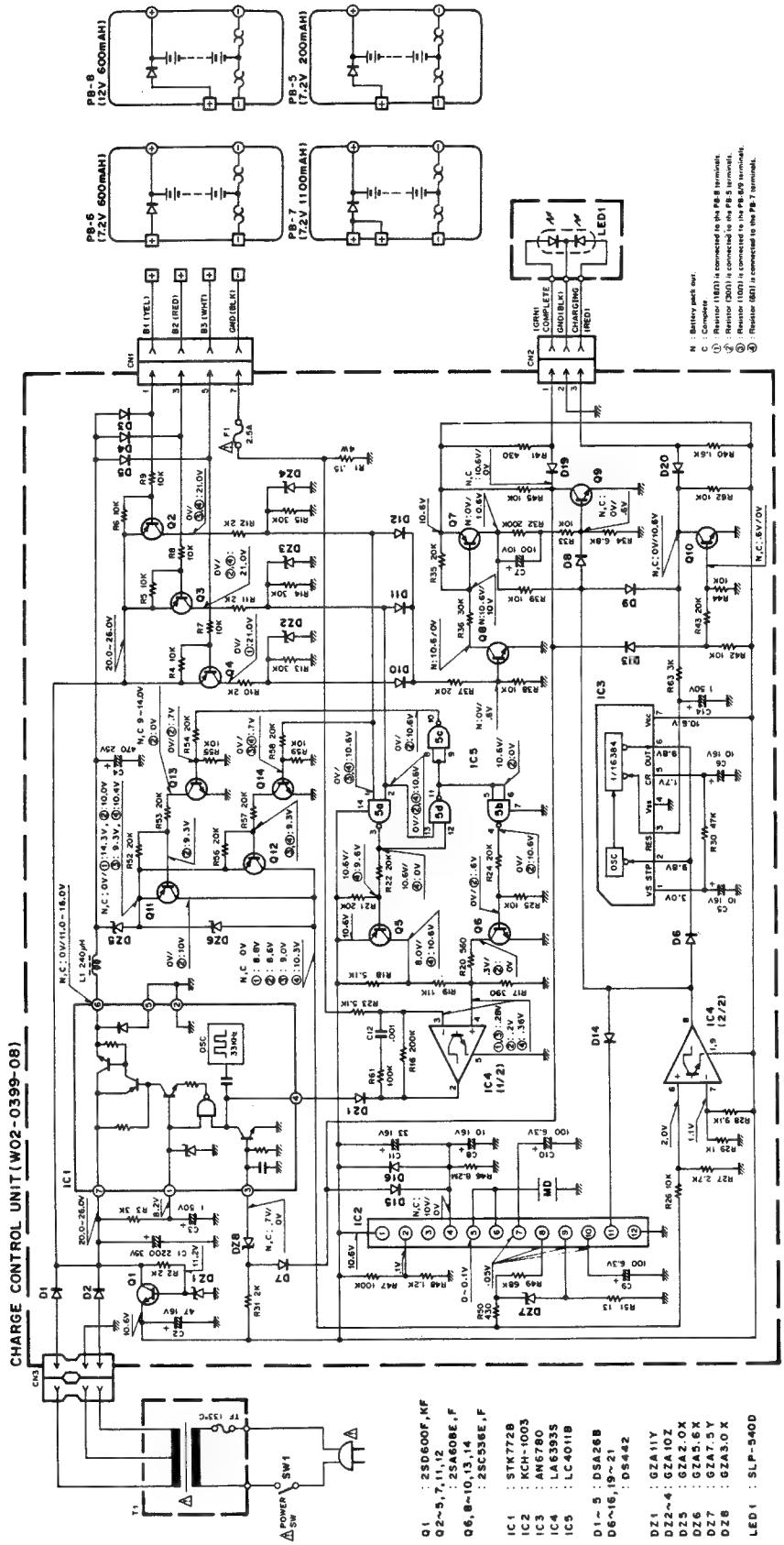


LA6393S



BC-11 (RAPID CHARGER)

BC-11 CIRCUIT DIAGRAM

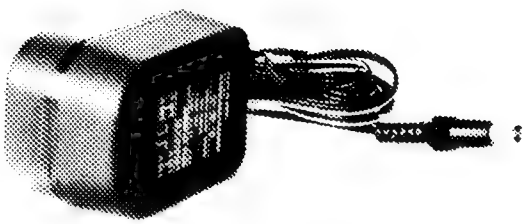


DC-4/5(MOBILE CHARGER)/BC-12(WALL CHARGER)

DC-4 EXTERNAL VIEW

DC-5 EXTERNAL VIEW

BC-12 EXTERNAL VIEW



HMC-2 (HEAD SET WITH VOX & PTT)

HMC-2 EXTERNAL VIEW

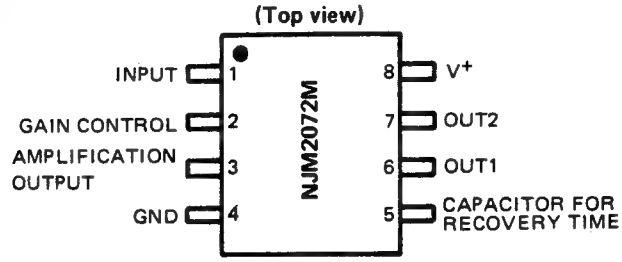
HMC-2 SPECIFICATIONS

Electrical characteristic

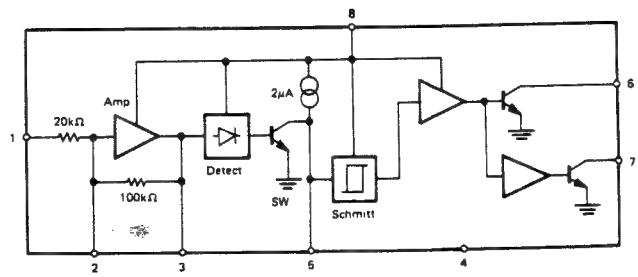
- **Earphone**
  - Diameter φ19
  - Impedance 19Ω (1000Hz)
  - Max. input power 50mW
- **Microphone**
  - Output sensitivity . . −67.5dB (0dB = 1V/μbar 1000Hz)
  - Output impedance 1.6kΩ (1000Hz)

HMC-2 SEMICONDUCTOR DATA

- **Terminal connection diagram**



- **Block diagram**



HMC-2 PARTS LIST

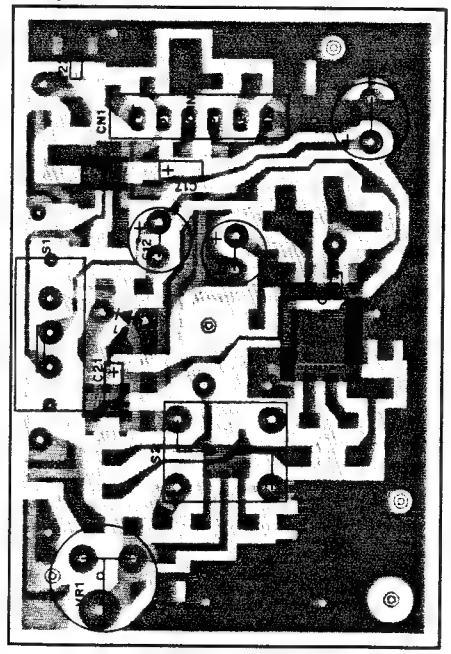
* : New Parts

Ref. No.	New Parts	Parts No.	Description
		A02-0840-08	Case (Front)
		A02-0841-08	Case (Rear)
		E30-2088-08	Cable with plug
		F09-0418-08	Microphone pad
		F09-0419-08	Ear pad
		J29-0427-08	Clip
VR1		R05-4422-08	Potentiometer 50kΩ
S1		S31-1416-08	Slide switch PTT/VOX
S2		S50-1413-05	Tact switch PTT
		T18-0056-08	Earphone with cable
		T91-0373-18	MIC ass'y
		W02-0806-18	VOX/PTT unit
Q1		FMG2	Digital transistor
Q2		FMW2	Digital transistor
Q3		2SC2712(GR)	Chip transistor
IC1		NJM2072M	IC
D1		1SS133	Diode

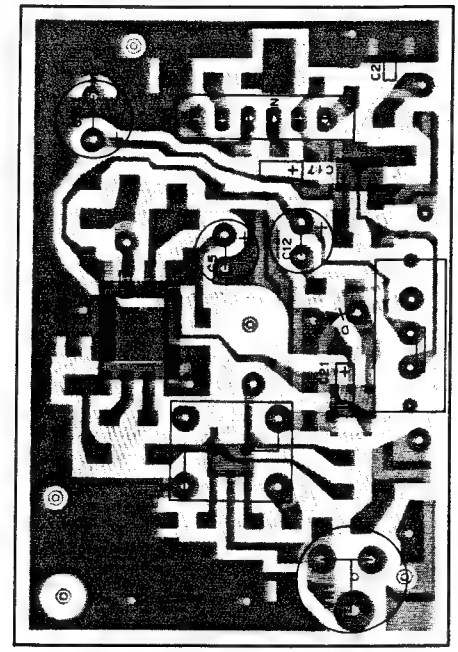
HMC-2 (HEAD SET WITH VOX & PTT)

HMC-2 PC BOARD VIEWS

Component side view



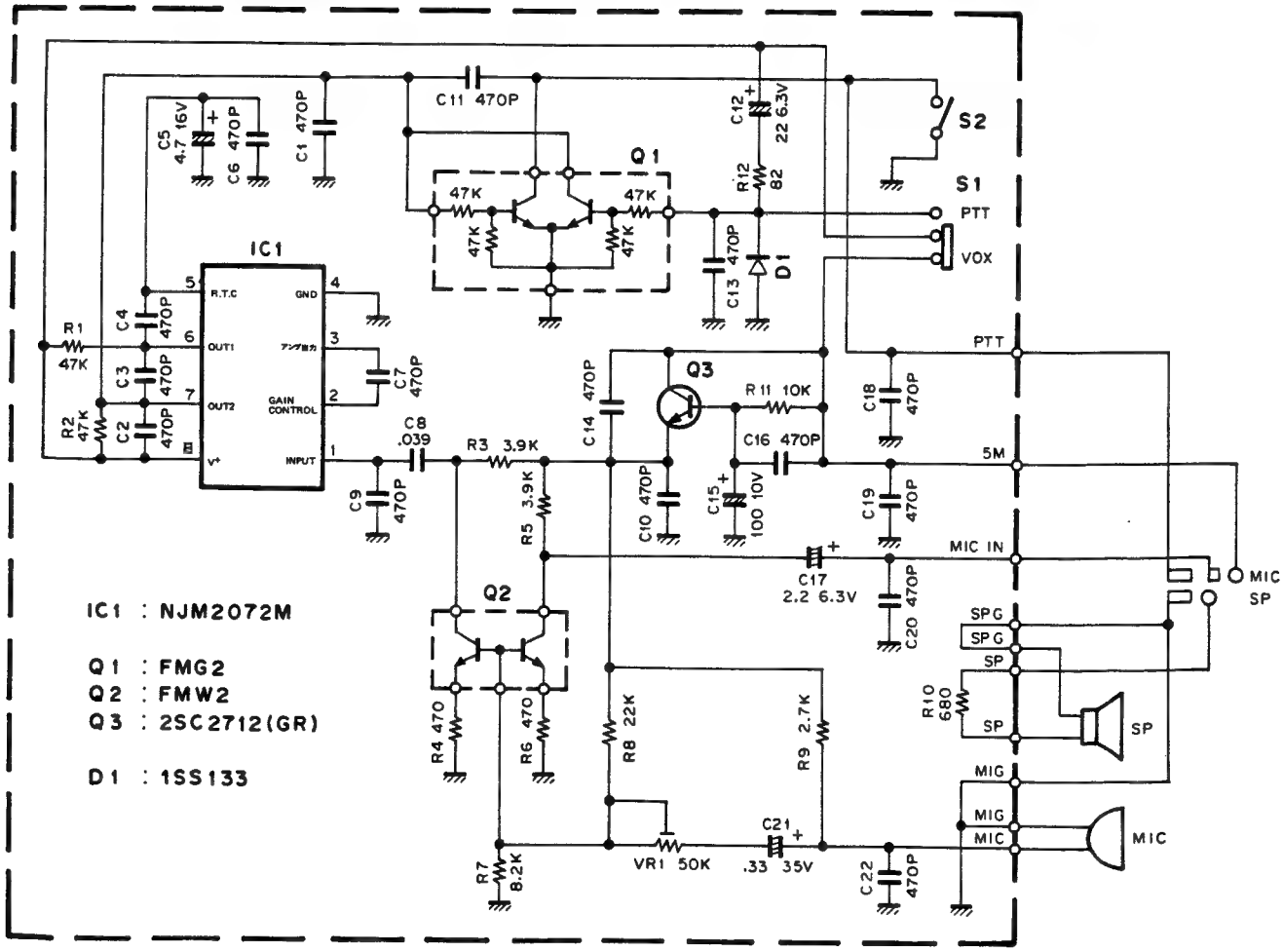
Foil side view



: Component side

: Foil side

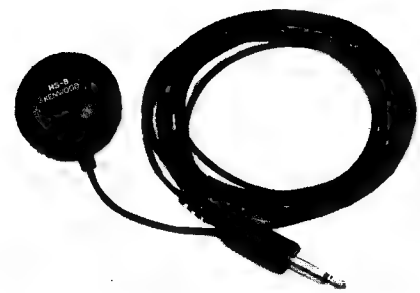
HMC-2 CIRCUIT DIAGRAM



HS-7/8/9(EARPHONE)

HS-7 EXTERNAL VIEW

HS-8 EXTERNAL VIEW

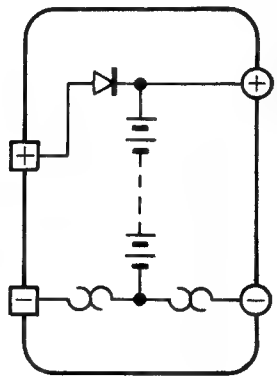


HS-9 EXTERNAL VIEW

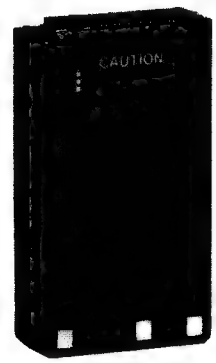
PB-5/6/7/8/9/10(Ni-Cd BATTERY)

PB-5 EXTERNAL VIEW

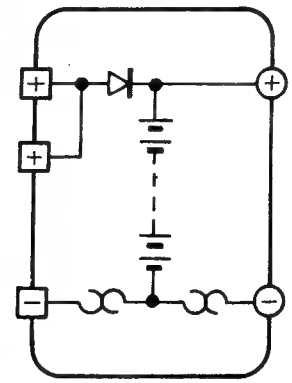
PB-5 CIRCUIT DIAGRAM



PB-7 EXTERNAL VIEW



PB-7 CIRCUIT DIAGRAM



PB-5 SPECIFICATIONS

Electrical characteristic

Voltage	7.2V (1.2V x 6)
Charging current	200mAh
Dimensions	58 W x 36.5 (39.5) H x 29.5 D (mm)
Weight	80g

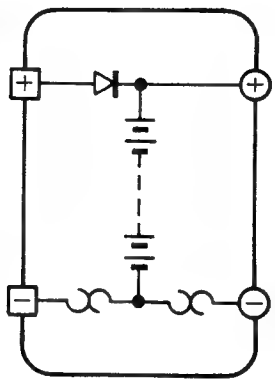
PB-7 SPECIFICATIONS

Electrical characteristic

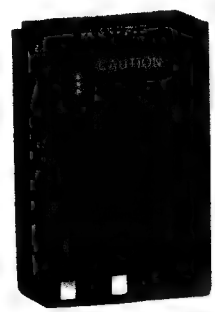
Voltage	7.2V (1.2V x 6)
Charging current	1100mAh
Dimensions	58 W x 98.5 (101.5) H x 29.5 D (mm)
Weight	300g

PB-6 EXTERNAL VIEW

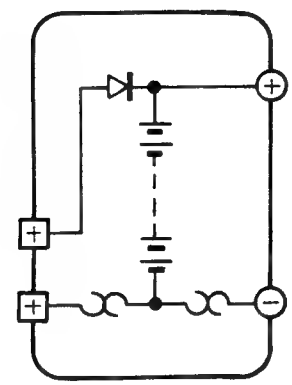
PB-6 CIRCUIT DIAGRAM



PB-8 EXTERNAL VIEW



PB-8 CIRCUIT DIAGRAM



PB-6 SPECIFICATIONS

Electrical characteristic

Voltage	7.2V (1.2V x 6)
Charging current	600mAh
Dimensions	58 H x 55.5 (58.5) H x 29.5 D (mm)
Weight	180g

PB-8 SPECIFICATIONS

Electrical characteristic

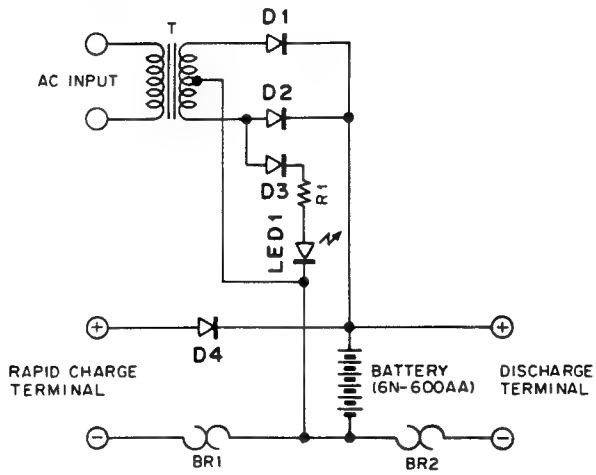
Voltage	12V (1.2V x 10)
Charging current	600mAh
Dimensions	58 W x 84 (87) H x 29.5 D (mm)
Weight	270g

PB-5/6/7/8/9/10 (Ni-Cd BATTERY)

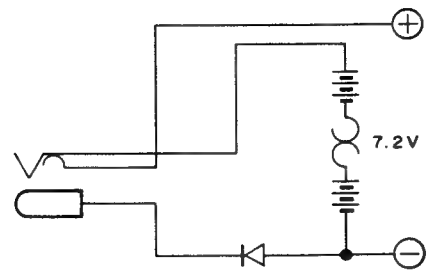
PB-9 EXTERNAL VIEW

PB-10 EXTERNAL VIEW

PB-9 SCHEMATIC DIAGRAM



PB-10 SCHEMATIC DIAGRAM



PB-9 SPECIFICATIONS

Electrical characteristic

Voltage	7.2V (1.2V x 6)
Charging current	600mAh
Charging input	AC 100 to 120V, 50/60Hz, 2.2W
Charging output	DC 8.0V, 100mA
Charging time	Approx. 10 hours
Dimensions	58 W x 98.5 (101.5) H x 29.5 D (mm)
Weight	260g

PB-10 SPECIFICATIONS

Electrical characteristic

Voltage	7.2V (1.2V x 6)
Charging current	600mAh
Dimensions	58W x 55.5 (58.5) H x 29.5 D (mm)
Weight	180g

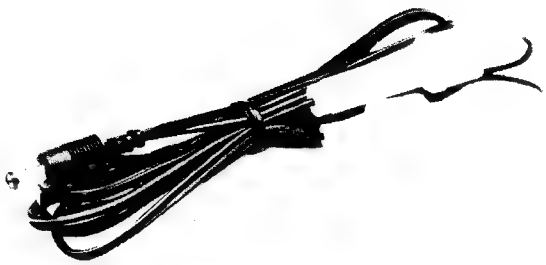
PB-5/6/7/8/9/11 CHARGING TIME

Battery / Charger	PB-5	PB-6	PB-7	PB-8	PB-9	PB-10
BC-9		15	30			
BC-10	8	8	15	8	8	8
BC-11	1	1	1	1	1	1

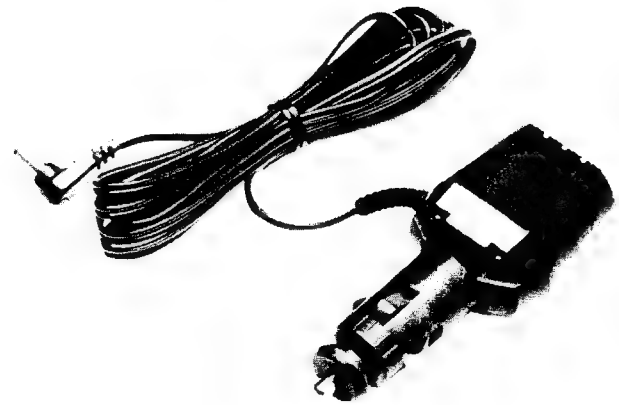
Unit : Hour

PG-2W (DC CORD)/PG-3F (PLUG WITH CORD)

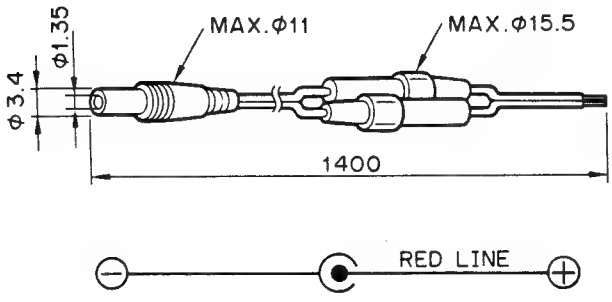
PG-2W EXTERNAL VIEW



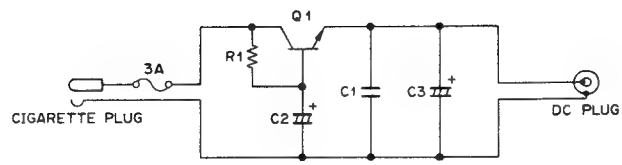
PG-3F EXTERNAL VIEW



PG-2W MAIN EXTERNAL DIMENSIONS



PG-3F CIRCUIT DIAGRAM



Q1 : 2SD717 (O,Y)
R1 : 22Ω 1/4W

C1 : 0.001μF 50V
C2 : 2.200μF 16V
C3 : 100μF 16V

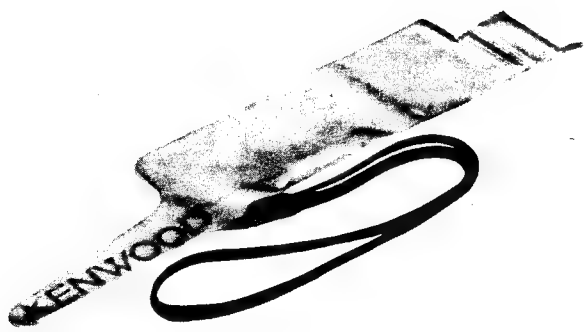
TH-77A/E

SC-28/29(SOFT CASE)/WR-1(WATERPROOF CASE)

SC-28 EXTERNAL VIEW
with PB-5, PB-6, PB-10 or BT-6

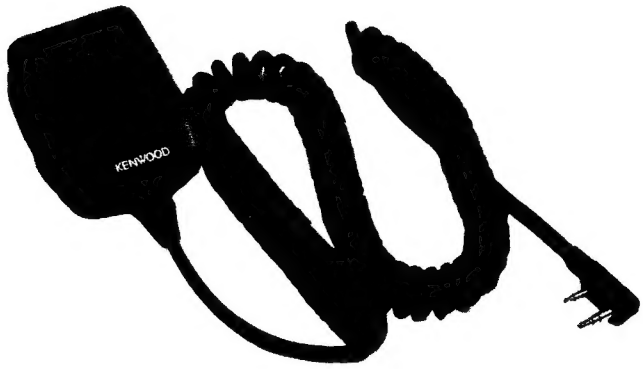
SC-29 EXTERNAL VIEW
with PB-7, PB-8, or PB-9

WR-1 EXTERNAL VIEW



SMC-31 / 32 (SPEAKER MICROPHONE)

SMC-31 EXTERNAL VIEW



SMC-32 EXTERNAL VIEW

SMC-31 SPECIFICATIONS

Electrical characteristic

- **Speaker**
  - Diameter . . . . . ϕ45 (mm)
  - Impedance 8Ω
  - Rated input power 0.15W
  - Max. input power 0.3W
- **Microphone**
  - Sensitivity . . . . . 66dB ± 3dB at 1300Hz
  - Output impedance . . . . . 2kΩ ± 30% at 1000Hz

SMC-32 SPECIFICATIONS

Electrical characteristic

- **Speaker**
  - Diameter . . . . . ϕ28 (mm)
  - Impedance 8Ω
  - Rated input power 0.5W
  - Max. input power 1W
- **Microphone**
  - Sensitivity . . . . . 66dB ± 3dB at 1300Hz
  - Output impedance . . . . . 2kΩ ± 30% at 1000Hz

SMC-31 PARTS LIST

* : New Parts

Ref. No.	New Parts	Parts No.	Description
		D10-0605-08	PTT lever
		E30-2110-05	Curl cord ass'y
		J19-1360-08	Clip
		T07-0219-08	Speaker
		T97-1024-08	Microphone

SMC-32 PARTS LIST

* : New Parts

Ref. No.	New Parts	Parts No.	Description
		E30-2127-08	Curl cord ass'y

SMC-33 (SPEAKER MICROPHONE)

SMC-33 SPECIFICATIONS

SMC-33 SPECIFICATIONS

Electrical characteristic

- **Speaker**
  - Diameter ..... ϕ28(mm)
  - Impedance 8Ω
  - Rated input power 0.5W
  - Max.input power 1W
- **Microphone**
  - Sensivity ..... 58dB±3dB (0dB = IV/μbar) at 1300Hz
  - Output impedance ..... 2kΩ ± 30% at 1000 Hz

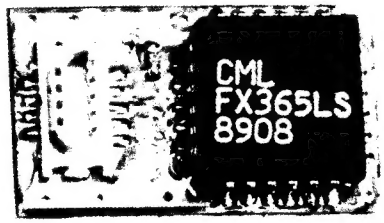
SMC-33 PARTS LIST

* : New Parts

Ref No.	New Parts	Parts No.	Description
		E30-2196-08	Microphone with Speaker
		T91-0392-05	Condenser MLC

TSU-7(CTSS UNIT)

TSU-7 PC BOARD VIEW



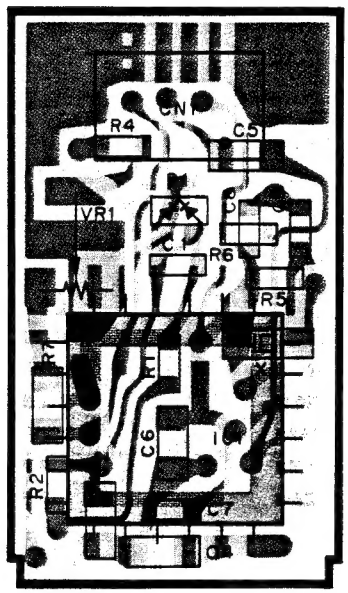
TSU-7 PARTS LIST

Ref. No	Address	Rart	Rarts No.	Description	Desti-nation	Re-marks
TSU-7 (X52-3170-00)						
			G10-0692-04	CUTTION		
			H21-0704-04	CUTTION		
X1		*	L78-0062-05	STAL (1MHz)		
IC1		*	FX365LS	IC		
D1			DAN202U	DIODE		
CN1			E40-5341-05			
VR1			R12-6526-05	TRIM. POT. (47K)		
R1			RK73BG1J274J	CHIP R J 270K		
R2			RK73BG1J824J	CHIP R J 820K		
R4			RK73BF1J103J	CHIP R J 10K		
R5			RK73BG1J105J	CHIP R J 1M		
R6			RK73BG1J473J	CHIP R J 47K		
C1			CK73GB1H471K	CHIP C K 470pF		
C2			C92-0521-05	CHIP TAN 20WV		
C4-6			CK73FB1E104K	CHIP C K 0.1UF		
C7			CK73GB1H471K	CHIP C K 470pF		
C8. 9			CC73GCH1H221J	CHIP C J 220pF		

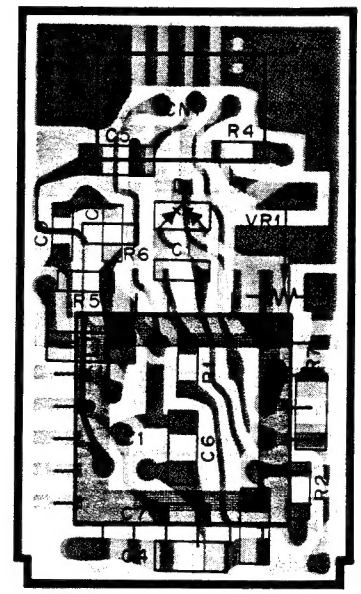
TSU-7(CTCSS UNIT)

PC BOARD VIEWS

(Component side view)



(Foil side view)



: Component side pattern : Foil side pattern

CIRCUIT DIAGRAM